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THE directors of the Calumet & Hecla Company have decided at a recent meeting to pass their dividend, an action reported to be due to the low price of copper

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"UNDERCONSUMPTION" is a word recently coined, and used with much favor. We are told, with an air of deep conviction and an assumption of great wisdom, that the trouble under which our industries are laboring is "not overproduction, but underconsumption." The idea on which this assertion is founded is, we believe, that a given quantity of any commodity is consumed under ordinary circumstances, and that similarly a certain quantity is produced. When less than that normal quantity is taken, we are suffering from "underconsumption," and when more than the normal quantity is made, there is "overproduction." We are not inclined to accept this view of the present condition of affairs. The consumption of the leading commodities in the country is heavy, as heavy as might be expected from so large a population. It is not fair to compare it with that of the past few years, because they were exceptional. They led to a sudden expansion of the facilities for output, and we are simply now gradually growing up to that excess by our natural development.

THE *Iron Age*, in an editorial on the "fuel question," argues that the coal mining and carrying companies are discriminating against local consumers, because in many instances manufacturers located nearer the mines must pay more, for instance, for bituminous coal than those on the seaboard. Our contemporary seems to forget that the price of coal is like every thing else, regulated by competition, and that the accessibility of many points by water has a good deal to do with the rates that railroads are able to demand. Manufacturers located at inland points may consider it a grievance that their coal costs them more than competitors at tide-water, but it might with equal justice be thought by the latter that it is unfair that they must pay more for rents, etc. No business man will expect to drive as close a bargain with one seller, to whom he knows he must go, as he will be able to do when he has three or four or more eagerly contesting for his trade. The coal-carrying companies fully appreciate the value of their "line" trade, which they foster with the greatest care ; but they can not be asked to scale down their rates all along their lines because they happen to be engaged in a "fight" at some single competitive or tide-water point. Not a year passes that there is not a sharp struggle for the business of a district into which a new competitor has penetrated, and the growing net-work of railroads over the country is rapidly extending the competitive area. It is a fact that every one who follows the developments in the coal trade is well aware of, that the distribution of coal by rail is steadily gaining, in spite of very low water freights, and that therefore the blessings of cheap coal once enjoyed only by those directly located at tide-water points, are extended far beyond their former limits. We know that the coal companies are not unreasonable. We know of more than one instance where miners of bituminous coal have voluntarily reduced the prices of their season contracts in consequence of the representations of manufacturers that they must seek relief against the falling in value of their products by reducing their fuel cost. The charge made by the *Iron Age* that "distant markets were to be the *ignis-fatuus* pursued by railroad managers and coal miners" is not justified. The bituminous trade is simply staggering under an enormous production, and the anthracite companies would be promptly ruined if they did not attempt to keep the tonnage within the bounds of the demand. That the latter do not go far enough, as we have insisted over and over again, is certainly not a matter about which manufacturers, whether located "along the line" or "at tide-water," have any reason to complain.

IN his annual report for the fiscal year ended June 30th, 1884, JOSEPH NIMMO, Jr., Chief of the Bureau of Statistics, gives the following figures of articles imported. Beginning first with iron and steel, we have the following data for the years 1883 and 1884 :

IMPORTS OF IRON AND STEEL.

	1883.		1884.	
	Quantities.	Values.	Quantities.	Values.
Ore, iron, tons	607,176	$1,586,597	553,806	$1,317,546
Pig-iron, "	433,602	7,944,982	283,172	4,932,598
Scrap, fit only to be remanufactured—				
Iron, wrought and cast, tons	70,964	1,240,490	46,506	653,105
Steel, tons	*	†	8,060	142,937
Bar iron, rolled or hammered, net tons	58,435	2,409,948	43,216	1,742,066
Bars, railroad—				
Of iron, tons	5,226	155,046	587	17,749
Of steel, or in part of steel, tons	112,837	3,678,794	7,384	234,697
Hoop, band, and scroll iron, net tons	5,877	205,955	160	8,296
Sheet, plate, and taggers' iron, net tons	11,747	751,206	9,233	684,668
Tin-plates, terne-plates, or taggers' tin, net tons	242,019	17,699,239	253,947	18,182,637
Cutlery		2,113,065		1,917,900
Fire-arms		1,453,225		1,355,335
Machinery		2,228,732		1,231,843
Cotton-ties, or hoops for baling purposes, of iron and steel, net tons	*		17,534	527,159
Hoops, bands, strips, sheets, and plates of steel, net tons	*		1,964	169,223
Ingots, blooms, slabs, billets, and bars of steel, and steel in forms n. e. s., tons	*		22,432	1,457,187
Wire rods (rivet, screw, nail, and fence), round, in coils and loops, of iron or steel, net tons	*	18,613,664	96,891	3,348,322
Wire, and wire rope and strand, iron or steel, net tons	*		3,568	462,781
Anvils, axles, and forgings, of iron or steel, net tons	*		1,221	136,674
Chains, of iron or steel, net tons	*		1,204	109,214
Files, file-blanks, rasps, and floats				40,810
Needles				371,936
All other				2,419,916

These figures clearly show how sharply the imports of iron and steel in all forms have fallen off, as the consequence of low prices. Ore has about held its own, but pig and scrap have declined very much. Steel rails have dropped to an insignificant figure, and the same may be said of band, hoop, and scroll iron. For the whole group of articles formerly included in iron and steel not enumerated, only a general comparison is possible. The figures for cotton ties, steel blooms, and wire rods are particularly

* Not stated. † Included in "all other iron and steel," etc.

interesting, showing the magnitude of that business even now. Altogether, the showing is a favorable one to our manufacturers.

Turning to the metals, we have:

IMPORTS OF METALS IN 1883 AND 1884.

	1883. Quantities.	1883. Values.	1884. Quantities.	1884. Values.
Tin, net tons	13,318	$6,106,250	13,007	$5,430,054
Brass and manufactures		530,281		486,737
Copper ore, fine copper, contained pounds	not stated.	122,536	2,259,833	226,189
Pig, bar, and old copper, pounds	323,987	35,510	361,606	38,743
All other manufactures of copper		236,719		261,756
Bronze manufactures	not stated.			764,592
Manufactures of lead		168,070		141,784
Zinc and spelter, net tons	8,662	664,474	2,682	190,692
Manufactures of zinc		141,677		40,458
Metals, metal compositions and manufactures				1,513,337
Platinum, pounds	3,105	297,959	2,862	289,898

With the exception of the imports of copper in ore, there is a decline in nearly every article. So far as copper in ore is concerned, we believe it refers almost entirely to Canadian and Spanish pyrites, almost all the metal extracted from which is re-exported. On the imports of soda, other chemical products, and a variety of miscellaneous articles, we present the following data:

IMPORTS OF MISCELLANEOUS ARTICLES.

	1883. Quantities.	1883. Values.	1884. Quantities.	1884. Values.
Crude asphaltum, net tons	not stated.		36,038	$145,571
Chloride of lime, "	47,188	$943,537	49,879	1,681,114
Muriate of potash	n. s.	n. s.	24,353	731,332
Nitrate of soda, net tons	58,939	2,336,661	60,601	1,983,376
Crude brimstone, gross tons	94,536	2,288,795	105,143	2,242,678
Nitrate of potash, net tons	5,477	390,488	5,198	321,738
Bicarbonate of soda, net tons	999	49,632	1,015	47,286
Carbonate of soda, including sal-soda and ash, net tons	173,627	4,221,899	156,127	3,705,568
Caustic soda, net tons	28,862	1,255,213	38,781	1,761,762
All other salts of soda, net tons	4,162	56,762	4,068	45,300
Salt, net tons	451,883	1,674,308	463,561	1,663,831
Crude phosphates, gross tons	49,381	429,391	21,910	243,843
Crude india rubber, net tons	10,823	15,511,066	12,287	13,736,004
Plaster of Paris, unground, gross tons	152,891	152,719	166,150	168,023
Plumbago, cwts	154,375	361,949	144,749	286,383
Cement, barrels	472,864	817,346	582,623	829,098
Clay and earths of all kinds, gross tons	23,552	220,550	27,716	222,394
Bituminous coal, gross tons	722,695	2,085,972	820,266	2,558,164
Mineral substances not elsewhere specified		107,752		116,494

These figures prove eloquently how much more there is for the development of our home chemical industry. In the aggregate, the sums that go abroad to pay for the imports of soda products are enormous.

For our exports, we possess thus far only values. Thus, Mr. NIMMO gives for the exports of domestic products of mining the following table:

EXPORTS OF THE PRODUCTS OF MINING.

	Values.
Coal:	
Anthracite	$3,053,550
Bituminous	1,977,959
Copper ore	2,930,895
Iron ore	12,081
Marble and stone, unmanufactured	188,245
Oils:	
Mineral, crude (including all natural oils, without regard to gravity)	5,302,974
Mineral, refined	41,447,595
Residuum (including tar and all other from which the light bodies have been distilled)	352,679
Ore, gold and silver bearing	1,052,341
Quicksilver	427,219
Zinc, ore or oxide of	16,865
All other	60,126
Total	56,822,529
Total value of domestic merchandise	724,964,852
Per cent of products of mining	7·84

In the list of exports of the products of domestic manufacture, the following figures are enumerated:

EXPORTS OF PRODUCTS OF DOMESTIC MANUFACTURE.

Iron and steel, and manufactures of	$21,909,881
Copper, manufactures of	3,442,767
Gunpowder and other explosives	1,177,922
Brass, and manufactures of	301,014
Tin, and manufactures of	166 819
Lead, and manufactures of	135,156
Zinc, and manufactures of	14,242
Agricultural implements	3,885,500
Horse cars	1,582.459
Passenger and freight cars	1,444,039

The figure for manufactures of iron and steel will probably surprise many by its magnitude, and the exports of manufactures of copper, it is gratifying to note, are beginning to exhibit the impetus of the low prices of raw material.

SCIENTIFIC HOODLUMS.

We are accustomed to view with comparative lenity the pranks of college boys, on the plea that they *are* boys. A lot of young fellows who have not yet developed a manly character or decided upon a manly purpose and career in life, are sent by their parents to take the academic course in an American college, that they may be trained into the qualities which they lack. If they engage with zeal in competitive games, we are glad of it, even though they carry their enthusiasm, now and then, too far. If, not satisfied with base-ball and foot-ball and boat-racing, etc., they go into "rushing" and "hazing," and whatever other forms of childish barbarity they choose to dignify with slang names, we reprove or punish them, according to the degree in which they break the peace, destroy property, or cruelly maltreat their weaker victims. But we still say, "Boys will be boys; they will outgrow these silly and brutal ways; and anyhow, this is a part of the time-honored system out of which, as we know, good and great men have been developed."

Even in ordinary colleges, there is no doubt, nevertheless, that the firm suppression of such abuses by the governing body would be wholesome and wise. The spectacle of a college faculty with nerve enough to send home a whole class for wanton violation of law and order and decency would be refreshing to parents and to patriots. But while our colleges are engaged in a keen competition for students, and are in larger measure dependent upon their fees for support, it is, perhaps, too much to expect that this Roman sternness of discipline will be maintained.

The case is different in technical schools. The young men in these schools have chosen their vocation, and addressed themselves in earnest to their life-work. They are enjoying the advantages of instruction and aids to instruction, costing much more than the fees they pay. They are allowed in many respects a larger liberty than academic students. If they descend to imitate the puerile follies and the brutalities of "college boys," they should not be so easily excused.

These observations are called for by the recent events and the present situation of affairs in the Columbia College School of Mines, where the undergraduates are indulging in tearing one another's clothes, punching one another's ribs, hooting and cat-calling, and hurrahing for '87 or '88, or some other date, like babes in the womb bragging of their future birthdays. This spectacle is presented by young ruffians who in a few months will be asking to be put in charge of important interests, involving a knowledge of sciences and laws and men and the rights of person and property. Is it likely that business men will trust them to-morrow, if to-day half of them ought to be spanked and put to bed and the other half clapped into the Tombs?

No doubt there are students at the School of Mines to whom these strictures do not apply. They are involved in unmerited disgrace by the behavior of the cubs who howl and tumble about the place. They have our sympathy and pity; and if they will come out in a manly way, to disclaim all connection with the silly rowdyism of their classmates, they shall have also a recognition from us that will be of substantial value to them in their professional careers.

Closely connected with the evil we have described is the practice of "cribbing." Both of them are rooted in a common feeling, or lack of feeling, to wit, a frivolous view of the technical course of training. The youngster who looks on the School of Mines as a place for class-sprees will also consider a lesson as something to be shirked, and a teacher as "fair game" for deception. It is an open secret that the professors at the School of Mines have had a good deal of trouble with "cribbing," and that it has not been wholly suppressed. In other words, one of the most admirable and complete institutions of the kind in the world, manned by a corps of able instructors, munificently endowed and wisely planned, is crippled in its efficiency, its instruction partly wasted, its degrees impaired in value and dignity, its usefulness imperiled, because a lot of hoodlums who do not appreciate what is done for them and what is required of them, choose to turn science into mockery. If a gang from the slums should mob the School of Mines, every body would be disgusted and indignant. Is it any better, when the mob is within, instead of without?

We sincerely hope that President BARNARD and the authorities of the school will put down the practices we have denounced and extinguish the spirit out of which they have sprung, if the buildings have to be emptied of students to do it. It is a shame that just as the "class feeling" is coming to be recognized as a curse and abated as a nuisance in all the larger and better American colleges, it should break out in its lowest form and threaten to take fresh root in a place where it has no ground, even of tradition, to justify its existence. The fools in the School of Mines are picking up the cast-off toggery that Harvard and Amherst and Williams and Yale and Cornell have—some of them completely, and all of them to some extent—outgrown. *

INTERNATIONAL ELECTRICAL EXHIBITION AT PHILADELPHIA.—The exhibition, which has been open since September 2d, closed October 11th. Its success has exceeded all expectations, the net profits being estimated at $50,000. The attendance during the exhibition was about 300,000. Authorities say that in practical results it has run far ahead of the Paris electrical exhibition.

PURE MAGNESIUM.—Grätzel's patent for the separation of alkaline metals by electrolysis has been very successful in the reduction of magnesium. At a late sitting of the *Electrotechnische Verein*, in Berlin, a ball of magnesium, of about 15 centimeters diameter, excited general attention. It was of superb brilliancy, similar to that of silver, and had lost nothing of its luster since its separation by electrolysis. This preservation is a sign of its chemical purity, and forms a remarkable contrast to the magnesium hitherto obtained, which was always more or less affected by potassium, and consequently easily oxidized, especially in a damp atmosphere. Magnesium seems destined to increasing maritime use; for its rays appear to have a greater penetrating power in fogs and mists than those of the electric light.

MESSRS. J. WALKER, PARKER & CO.'S LEAD-WORKS.

The Dee Bank Lead-Works.

These works, says *Engineering*, are one of Messrs. Walker, Parker & Co.'s numerous establishments. They are situated at Bagillt, on the estuary of the Dee, and adjoining the Chester & Holyhead Railroad. Here the operations of smelting the lead ore are carried on, and pig-lead is desilverized. Sheet-lead is also rolled, and red lead manufactured on the premises.

The lead ore is smelted in the manner generally known as the Flintshire process, which is by reduction in reverberatory furnaces. These are of the usual type, being of rectangular construction, and built of fire-brick bound with iron, and are 20 feet long by 11 feet wide. There are three doors on each side. The working bottom of the furnace is made up of slag from the process, and slopes on all sides toward the tap-hole in front. The charge consists of about one ton of ore, to which is added about 2 cwt. of "fume" collected from the flues, to which we shall make more special reference shortly. The ores at present worked are of a very pure and rich description, obtained from the English and Welsh mines, the average assay showing 80 per cent of metal, thus nearly reaching the possible percentage. Fires are made up in the coal-burning furnaces placed at the sides, and the burning gases and products of combustion are conveyed to the space above the smelting-hearth. The charge is worked by hand-rakes, and as lead is separated, it flows down to the tap-hole. It is ultimately run into the tapping-pot, sunk in the ground in front, and, having been skimmed clean, is cast into pigs in iron molds. The waste gases and escaping fumes from these furnaces, as well as from all others in the works where the gases are brought into direct contact with substances containing lead, are conveyed to a large underground flue situated on the high land at the back of the works. This flue is 1¼ miles in continuous length. It is oval in section, the maximum and minimum diameters being respectively 7 feet and 6 feet. It is built of brick in the ordinary way, and arranged in an oval coil of 6½ turns. The total length of all flues on the works, including the one described, is two miles and 400 yards. This flue discharges into a chimney-stack 258 feet high and 12 feet in diameter. This unusual length of flue is for the purpose of collecting the flue-dust or "fume" that is carried over from the furnaces with the smoke. It is principally composed of sulphate, sulphide, and oxide of lead, and contains as much as from 55 to 60 per cent of metal. In the ordinary way, the fume is got out by flushing the flues with water that is run into settling-pools in the works; but once a year, they are opened out and thoroughly cleared, when an additional quantity of from 300 to 400 tons is taken from them, this being what the flushing process has failed to dislodge. Until this flue was built, nearly the whole of this valuable material was discharged in the air, and was a notable instance of matter in the wrong place, being fatal to the surrounding vegetation.

From the working of the furnace, there results a certain residue known as "gray slag," which is drawn out by the doors at the back. About 90 per cent of the contained lead is got out at the first operation, and a considerable part of the remaining quantity is contained in the slag, and in order to recover this, the slag is worked over again. It is a small detail, but perhaps one worth noticing, that each furnace has been designed with a small oven, wherein the men cook their dinners. There are eleven of these furnaces at work, each having four attendants, who work in equal shifts. The fuel is a coal obtained from a pit a few hundred yards off. The gray slags and other residues are worked up by flowing-furnaces, in which they are placed, together with suitable fluxes, and are run down at full smelting heat, until completely liquefied. All lead is thus reduced out, and leaves a liquid slag, which, when set hard, is taken to the tip. The lead obtained in this way is technically known as slag lead, and is very hard, owing to the presence of antimony and other impurities, so that it requires to undergo a process of improving before it can be desilverized. These latter furnaces are of the reverberatory direct-acting type, resembling those used in copper smelting, and are worked at far higher temperature than the ones previously described, having a larger grate. The charge is about 1½ tons. From the tapping-hole, the charge of lead and slags is run into a large tapping-pot, which retains the lead while the slags overflow and pass on to a cinder-bed, known as the "slag-run." After cooling, these slags are assayed, and, if found worth the operation, are worked over again; if not, they are thrown on the tip. There are three of these flowing-furnaces. The lead resulting from these processes contains a certain amount of silver, which it is the object of the desilvering process to extract. Messrs. Walker, Parker & Co. also buy large quantities of lead in addition to that produced in their works. The desilverizing plant at the Dee Bank Works has been erected within the last year and a half, from designs by Mr. W. M. Hutchings, the manager, and is perhaps the most modern and complete of its kind in the country. The system of separation followed is known as the zinc process, which is found to be far more economical, especially in the matter of labor, while at the same time the lead is of a better quality, that produced by this firm having, we understand, a high reputation in the market The plant consists, first, of several semi-spherical cast-iron pots, which are mounted in a setting of brick-work. This also forms a platform from which they are worked. The larger of these pots, of which the diameter is 6 feet 5 inches, is used for melting the lead, the scum from which is removed as it rises. Having been brought to above the melting-point of zinc, a certain quantity of that metal is added, and the whole is then thoroughly incorporated. The pot is then allowed to cool for some hours, during which time a crust consisting of an alloy of zinc, lead, and silver forms on the top; the zinc having the property of extracting the silver from the lead, and rising with the former to the surface, as the cooling of the mass progresses. This crust is skimmed off by perforated skimmers into the second series of pots placed alongside. These are known as liquating pots. After the first process, the quantity of zinc is considerably reduced; but if necessary, the lead is subjected to a second and even to a third treatment, the total amount of zinc used depending on the quantity of silver present. When the lead is sufficiently desilverized, it is tapped through a spout in the bottom of the pot into a softening-furnace, which is of the same type as those described, and is heated by its own fires. In this, the zinc and other impurities contained in the lead are removed by oxidation at red heat, the impure matters forming at the top. When the tests show that the lead is perfectly pure, the fire is drawn and the furnace is cooled down until the crust floating on the top is hardened sufficiently to be skimmed off. This crust, being eventually smelted, gives a hard description of lead. The lead remaining in the furnace after skimming, is known as market lead, and is run into a pot, whence it is run into pig molds, arranged in a semicircle around the pot, and below its level in the casting-pit. A swivel launder that can be turned to serve each mold in turn prevents the necessity of using a ladle or shifting-troughs, the spout or launder forming a radius of the pit, and pivoting on the center, which is under the tapping-hole in the pot. The flow of metal from the pot is controlled by a plug worked by means of a shaft with a thread turned on its upper part, and which works through the molten lead in the pot. It should be remarked that the arrangements for handling the material have been carefully planned. There are tram-lines laid all through, and there is a steam hoist for lifting the pigs to the higher level.

The crusts of zinc containing the silver are heated in the liquating-pots, in order to remove some of the excess of lead that they carry over, and the rich alloy left, which contains all the silver of the original charge, is taken away to be further treated in the distillery.

The distillation of the rich alloy is carried out by mixing it with a given proportion of culm, in plumbago retorts, when a large proportion of the zinc is brought away and distilled with cast-iron condensers, in which it is recovered for future use in the furnaces, while the lead and silver of the alloy are ultimately produced in bars of great richness, from which the silver is extracted by the final process of cupelling.

The plant now in use produces at present over 300 tons a week of market lead; but if necessary, double that quantity could be turned out, as there is a duplicate set of pots, not at present in use. This new plant also includes large and improved furnaces, and other appliances of considerable extent and recent design.

The process of "cupellation," or "bone-ash test," followed for separating the last of the lead from the silver, is one of great antiquity, and remains practically the same in principle as it has been from time immemorial. Indeed, we believe that Dr. Percy claims to have found a full description of it in the writings of the Old Testament. However this may be, we will give a brief record of the process as followed by Messrs. Walker, Parker & Co., as there may have been a few alterations in detail of late years.

The "rich bars" containing the silver are brought to the refining-furnace, which is a small reverberatory furnace with a movable hearth. The latter consists of an iron frame, into which a container of bone-ash has been rammed. The frame that forms the hearth is supported in its place in the furnace by cross-bars and wedges. The lead containing silver is melted in the furnace, when liquid oxide of lead or litharge will form. A low blast from a fan is turned on at the back of the test, and the liquid litharge is driven to the front, where it flows off through gates cut in the bone-ash and is received into small pots that are placed on wheels and drawn away to an open floor. As the lead is in this way drawn away, its place is taken up by fresh bars of the combined silver and lead, being fed down suitable pipes, so that they melt off continuously. The oxide of lead produced carries with it very little of the silver, which is practically not oxidized. In this manner, the silver goes on constantly concentrating in the test until the latter is full, when no more bars are added, and the silver is refined by several hours of strong fire with blast. It will be seen, therefore, that it is gradually separated by three separate processes: first, by means of zinc, which removes a greater part of the lead in the liquating-pots; secondly, by distillation in plumbago retorts, when the zinc is removed; and thirdly, by refining in the bone-ash tests. The annual production of silver at these works is about 13 tons a year.

So far, we have treated of the smelting and desilverization of lead, which forms the chief branch of the Dee Bank Works.

The litharge we have made reference to is an extensive article of commerce. It is not only obtained as a by-product in these works, but is manufactured specially from pure lead, not containing silver, the process followed, however, being similar to that just described. The large cakes from the furnace are allowed to lie for several days on an open floor, when they gradually "fall," producing about two thirds weight of flake litharge, which is in the form of small crystallized scales, the remainder being "coarse litharge" in lumps. The two are separated by sifting, and the latter is ground up and levigated.

The manufacture of red lead begins with the process of "drossing," which is carried on in ovens that very much resemble those ordinarily used by bakers, in general appearance. There is no chimney, however; the smoke and products of combustion collecting in the dome above the sole on which the dross is placed, and passing out at the oven door, there being a hood in the front into which they ascend. The operation is begun by forming a dam across the front with dross left from the last operation. Behind this dam, a charge of pure pig-lead is melted, and as soon as it reaches a dull-red heat, the workman begins working it with a long-handled rake, suspended about the middle by a chain and hook hanging in front of the door. By a peculiar action, the bath of lead at a dull-red heat is agitated and splashed about, being thrown to the back and sides as formed. A small quantity of antimony in the form of antimonial lead is thrown into the bath from time to time, as antimony in small quantities has the effect of increasing the oxidation of lead in a somewhat remarkable manner. The whole charge, which consists of about 27 cwt., is drossed and converted into yellow oxide of lead in about six hours. The dam is then broken down and removed, and the dross is left in the oven to calcine for several hours longer, during which time it is repeatedly turned over for the purpose of facilitating the draining away of metallic lead entangled in it. This lead trickles down the sloping bottom of the furnace, and flows out at the oven door.

The dross is taken away and wet-ground in an ordinary mill, and levigated. The coarser particles are collected in a settling-vat, locally known as the "bran-tub," while the finer dross is carried forward to other settling-tanks. The ground and levigated product is now yellow oxide of lead, and is taken forward to undergo the third stage, which consists in the process of coloring. A charge of about 35 cwt. is introduced into the bottom of the coloring-oven, which in every practical respect resembles the last described. Here the dross remains forty-eight hours, being subjected to a low red heat, which has to be carefully regulated,

and during which time it is carefully turned with rakes. By the absorption of oxygen from the atmosphere, a higher oxide of lead is gradually produced, having the color characteristic of red lead. Great care is needed during the final process, as, if the heat in the ovens be allowed to become too high, the red lead already formed may be destroyed; if, on the other hand, the temperature be too low, the proper coloring does not take place. In order to complete the material for use, it is again ground and levigated, and finally dried in stoves. A large quantity of this material is produced for glass-making purposes. It is made in the manner described, but requires additional care in its purification, and all the ingredients have to be of exceptional purity. The ovens used for the production of this special kind are never employed for any other purpose.

The variety known as orange lead is very similar in composition, when finished, to red lead, but is made from somewhat different material. In this case, white lead is used in place of the blue lead, as in the other process.

THE GROWTH IN ENGLAND OF THE MANUFACTURE OF SULPHURIC ACID AND OF SODA.

Prof. G. Lunge, the great authority on the manufacture of soda, has published an article on the growth of the manufacture of sulphuric acid and of soda in Great Britain that is well calculated to remove erroneous impressions. The following table gives the imports of iron pyrites and of sulphur, column II. being the quantity of cupriferous cinder treated in the extraction-works, from which it is possible to estimate the quantity of cupriferous pyrites used for the manufacture of sulphuric acid, on the basis of the ratio of 70 to 100. The figures thus found are given in column III.:

Year.	I. Pyrites imported. Tons.	II. Cinders worked for copper. Tons.	III. Cupriferous pyrites burned. Tons.	IV. Imports of brimstone. Tons.
1872	516,299	253,529	362,184	.....
1873	5 0,9?9	323,910	462,7?9	.....
1874	500 831	329.004	470.006	51,821
1875	539.256	365.368	521.954	55,876
1876	505,301	379,269	541.813	4 ,?35
1877	680,033	427,954	611,363	54,167
1878	577.719	402,716	575,308	43.604
1879	481,6?2	385.874	551,250	41,012
1880	657,867	415.367	593,670	46 896
1881	542,046	396,737	566.767	40,561
1882	626 902	434,427	620,610	47,?78
1883	600,673	439,156	627,365	43,882

This table shows that for a number of years cupriferous pyrites were used almost exclusively, and that a certain quantity of brimstone is always imported.

The following table shows the origin of the pyrites imported into England:

IMPORTS OF PYRITES.

Year.	Norway.	Portugal.	Spain.	Germany.	Other countries.	Total.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1873	67,462	119,559	246,692	.....	6,634	520,347
1874	41,044	162,569	294,117	.....	907	498,637
1875	21,820	165,433	344.019	.....	6,283	537,555
1876	7,688	56,579	419,068	.....	21,417	504,752
1877	8,564	149,562	498,977	.....	22,209	679,312
1878	5,773	136,705	419,561	.....	12,318	579.261
1879	8,485	82,529	374,505	.....	15,837	481,392
1880	10.952	166,519	463,199	8,695	8,684	658,047
1881	6,009	140,079	379,?16	8,412	8,662	542,378
1882	.....	114,132	497,807	.....	15,761	627,700

The above table shows clearly how the cupriferous pyrites of the Peninsula have crowded out the ore from other countries.

The following table shows the growth of the manufacture of sulphuric acid, reduced to monohydrate, H_2So_4, and its use for different purposes. The figures in column I. are computed from the first table, column III., assuming 100 parts of pyrites to yield 130 parts of the monohydrate. Column II. is computed from the data available on the quantity of salt converted into sulphate by the Leblanc process. It is customary in England to estimate 7 parts of salt to 4 parts of pyrites, so that the consumption of 100 parts of salt is equivalent to a consumption of 75 parts of sulphuric acid. The quantities given in column III. are undoubtedly used almost entirely for the manufacture of fertilizers, because the other requirements are almost completely covered by the acid made from brimstone given in column IV., and are computed on the basis that 100 parts of brimstone yield 285 parts of sulphuric acid:

SULPHURIC ACID PRODUCED IN GREAT BRITAIN.

Year.	I. Made from pyrites. Tons.	II. Pyrites acid used for manufacture of sulphate of soda. Tons.	III. Pyrites acid used for other purposes. Tons.	IV. Acid made from brimstone. Tons.	V. Total acid made. Tons.
1878	747,900	417,406	350,494	124.271	872,171
1879	716,625	445,265	271,360	116.884	833,5?9
1880	771.771	501,612	270,159	133,653	905 424
1881	7?6 797	475,724	261,073	115,599	852,396
1882	806,793	472,151	334.642	134.742	941,535
1883	815,574	484,252	331,322	125,064	940,638

The consumption for the manufacture of sulphate, as the first step of the Leblanc soda process, does not appear to have suffered much as yet from the inroads of the ammonia soda process. The quantities in column III., being the amount required by the fertilizer industry, show the greatest fluctuations. The assumption that all of the brimstone is used for the manufacture of sulphuric acid is justified as follows: English authorities assume that fully 90 per cent of the brimstone is so used, and that only 4000 tons of brimstone are annually used for other purposes, the ultramarine manufacture being restricted, the bleaching industry requiring only small quantities, the manufacture of sulphur matches dwindling down steadily, so that the manufacture of gunpowder has remained the principal factor. On the other hand, considerable sulphur is made from soda residues and in the manufacture of gas, so that the method of estimating the entire brimstone imports as being used in making sulphuric acid is not far out of the way.

The quantity of brimstone acid may prove a surprise to many, but there are, in the vicinity of London, in Lancashire, and in other parts of the country, a number of works using brimstone. All the bleaching-works and tin-plate mills use brimstone acid, and the greater part of the sulphate of ammonia made is manufactured from it. There is a prejudice in favor of it, so that there is a large difference in price. Thus, only from 27 to 30 shillings are paid at works in Lancashire for 60-degree Beaumé pyrites acid, against 50 shillings for from 50·5 to 51 degrees Beaumé brimstone acid.

The following table shows how the soda industry developed:

PRODUCTION OF SODA IN GREAT BRITAIN.

Year.	I. Ammonia soda, 48 degrees.	II. Calcined Leblanc soda, 48 degrees.	III. Caustic soda, 60 degrees.	IV. Soda crystals, 21 degrees.	V. Bicarbonate of soda, 38 degrees.	VI. Leblanc soda. Total, 48 degrees.	VII. Total soda, 48 degrees.	VIII. Total soda, computed as 100 per cent Na_2CO_3.
	Tons	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1878	10,000	197,992	84,612	170,872	11,756	387.808	397,808	326,203
1879	18,000	228,209	86,511	185,319	13,083	427.837	445,837	365,586
1880	26.000	258,893	116,384	192,926	13,5?9	486,882	512,882	420,563
1881	34.000	225,087	108 310	203.773	12,353	459,856	493,856	404,962
1882	42,000	230,213	116,864	180,846	14,115	466,?62	5?8,562	417,021
1883	52,000	228,034	119,929	188,678	13,609	471,220	523,220	429,040

Only one works, that of Bounner, Mond & Co., is now making ammonia soda. The figures for calcined soda and the totals in columns VI. and VII. are calculated to 48 degrees, equivalent to 82 per cent of Na_2Co_3.

The idea generally held, that the production of Leblanc soda is rapidly declining in consequence of the introduction of the ammonia soda process, is proved to be erroneous by the above table. Ammonia soda covers only one tenth of the output. On the other hand, the decline in prices has been great. Until recently, hydrochloric acid was not a factor in the question of profits with a good many English soda-works, and the depression in values caused the closing of those works that were not favorably located. The falling off in the output caused by the closing of 20 smaller works in England and Ireland has been more than compensated for by the increased production of the large English works. Since the price of pyrites has been reduced considerably in England, the Leblanc soda-works are in a better condition to compete with the manufacturers of ammonia soda. Besides, a pool has been formed to control the price of bleaching-powder, and the hydrochloric acid produced in the sulphate manufacture has an intrinsic value, while it was formerly considered a waste product in England. It seems immaterial whether the ammonia soda-works succeed in utilizing their chloride of ammonium for manufacturing hydrochloric acid, because it will always cost them more than the Leblanc soda-works, which are forced to condense the hydrochloric acid. Mond's ingenious new method does not seem capable of any thing but a limited application. Even in theory, it involves the production of two parts of sulphate of ammonia to one part of carbonate of soda, and the whole of the 75,000 tons of sulphate of ammonia produced in England in 1883, even if they could be supplied by the Mond works—which is incredible in view of the amounts obtained from gas-water—would theoretically correspond to 30,000 tons of soda, or hardly one half of the present output of that establishment.

SOME MORE "MINERAL BLOSSOMS."

Mr. J. Van Cleve Phillips, the famous writer of "Mineral Blossoms," has overhauled us in the following manner for not appreciating the importance of his views:

"This critic, whoever he may be, is evidently in the chrysalis state, or what a silk grower would call the 'grub condition.' He has not read what Bossuet says of Plato: 'He teaches us nothing, yet brings us in the light where we shall know and comprehend all,' or Emerson where he says: 'Is it your business to study nature or the laws of the world, beware of proposing to yourself any end, your end must be inapprehensible to the senses.' This critic's end has always been apprehensible to his senses—and from that cause nature has shut up the door of her geological archives, and pushed him out of her temple.

"It has been the misfortune of many American mining journals that they have been edited by men who never worked in a mine, or had been explorers for mineral veins, as to one without this practical knowledge, the 'Mineral Blossoms' must appear a little gaseous. This critic has not yet realized that the world at one time was as gas floating in the nebulous matter in space, that this gas is now solidified in iron mountains, coal, lead, copper, and silver and gold veins; that the object of man being here is to make this gas become solid, so that it can be carried about in the pocket as coin and utilized as metal, and as the law of all mineral fields has its counterpart in the human mind; to see this vein system in all its relations, it is necessary that the mind must go out in the regions of ether and learn how these metallic atoms were filled in the veins, else the writer will prove as a blind guide."

With the public as our judge, we rest our case after plaintiff's statement.

PHOSPHORESCENCE OF THE DIAMOND.—Experiments have lately been made with a diamond of 92 carats, which is one of the finest known outside of royal or national collections. It is of wonderfully pure water, and is admirably cut with 64 perfectly geometrical facets. Its value is estimated at $60,000. When exposed during an hour to the rays of the sun, it preserved for more than twenty minutes, in a dark chamber, a light sufficient to show the white paper that reflected its rays. The same phenomenon was exhibited, but with somewhat less intensity, after having submitted the diamond to a powerful electric light. A very apparent phosphorescence was also produced by rubbing the diamond for a few moments with flannel.

MR. COLEMAN SELLERS ON THE METRIC SYSTEM.

In a communication to the Philadelphia *Public Ledger*, dated at Eisenach, August 24th, Mr. Coleman Sellers, a member of the firm of William Sellers & Co., of Philadelphia, gives his impressions of the very slow progress the metric system is making toward general adoption among the leading nations of the world, together with a statement of his objections to the system. He says:

A pouring rain that prevents sight-seeing and almost hides the towers of Wartburg Castle on the hill opposite gives me a chance to say a few words about an article recently published, which says that the librarian of the Paris Geographical Society has prepared a table showing what countries have adopted the French metric system and have made its use obligatory. The total population of these countries is given, and it professes to show that the people who use this system are vastly more numerous than those who do not, and among the minority are mentioned Great Britain and the United States. Thus, those using the system aggregate, say, 241,972,011, as against 97,639,825 not using it.

I notice among those countries where this system is said to be in compulsory use Norway, Sweden, and Denmark. Now, I have just visited these three kingdoms, and while there, I made it my business, as I have done in other countries, to make a full inquiry into the practical operation of the French metric system. I find that the governments of the three countries above mentioned have adopted the system, and have appointed a date a few years in the future when its use will be obligatory; but as yet it is not in general use, except among the employés of the government or in the government depots. The people at large know little or nothing about the subject, and small progress has been made toward preparing them for the change. In the railroad stations, may be seen charts hanging on the walls that give the system in a graphical way, and the weight of the luggage upon which an extra charge is made is computed in kilos, not in pounds; while every thing weighed in the shops or markets is reckoned in pounds or measured by a "yard-stick," which is 25 of our inches in length; this I give from actual measurement, although the shopkeepers say that the Swedish measure for cloth is two thirds of the English yard. In Denmark, so little is known about the enforced adoption of the French system that an important shopkeeper told me that it was never to be adopted.

What I wish to make clear to your readers is, that the mere fact that the inhabitants of the countries using the metric system are more numerous than those of the countries that do not use it does not furnish so strong an argument in favor of the enforced adoption of this system as would at first appear. The interests involved and the industries that would be affected by the change must be considered. The uprooting of any established system of weights and measures is a matter of very serious import, aside from any question of the relative merits or demerits of the adopted or abandoned systems, and this is especially true of manufacturing countries, where vast and varied processes depend on established standards. It is not an exaggeration to assert that the confusion and loss caused by a change in the system of measurement in Russia, with her millions of peasantry, would be less than that sustained in the city of Philadelphia alone from a like cause. England and America combined control the majority of the commerce of the world. England and America combined lead the engineering output of the world.

To the merchant who buys and sells, it makes no matter if the yard is one of 25, or 36, or 39·39 inches long, nor if the pound weighs more or less than a pint of water; but to the engineer, the matter is of more vital importance. I have gone this summer through the workshops of almost all the great countries on this side of the water and in those of Germany. I have seen the practical use of the system that I have for so long a time condemned. I frequently asked engineers if they like the system, and if they use it, and I will give the answer of one in Berlin: "We use it because we have to, and it is better to have some uniform system than the many measurements that formerly prevailed in the German states. The unit of the machine shop is the millimeter in every thing except bolts, nuts, and screws. All bolts and nuts are made to the English inch, because we use the Whitworth system. We do not like the metric system, because it has too small a unit, and the meter is too large and involves the use of decimals."

In Philadelphia, the firm of William Sellers & Co. adopted the French metric system in an important part of their works as long ago as thirty years, and have continued its use since, until their workmen are as familiar with it as with the inch. With all this long practice during my connection with the firm, I have written and spoken against the enforced adoption of the system, not only because of the expense involved in changing, but because it is not a practical system; it permits of no elastic gradation of shop or trade sizes. The millimeter is taken as the standard, to avoid the complication of the constant use of decimals, as nearly all measurements in machine work are less than one meter. This small measure involves many figures, and does not permit any good memorizable series. The inch cut up into the natural division by constantly halving permits the use of sizes best suited to the needs of the workmen.

The standard of the French system is a certain bar, kept for comparison; so is the English yard, from which we get our feet and inches. The high-flown notion that the meter is a measurable portion of the quadrant of the earth's circumference has been given up long ago, and the measurements of England and America are on a better basis of accuracy to day than those of any other country. The French system theoretically predicates its weights on the weight of a cubic decimeter of distilled water at a temperature of 39·1 degrees Fahr., the weight of which is called the kilogram, and is 2·2 of our pounds; but really the standard unit of weight is the platinum-kilogram weight deposited in Paris.

Swedish iron and steel are rolled to English inches in size; so, also, their boards are cut to the English inch, because their market is largely in those countries that use the inch. In the Russian machine-shops, the English inch is used exclusively, and, as I have said, throughout all Germany it holds for all screw sizes. In France and in Belgium, the yard stick is the meter hung from a rod like the cross bracket of a drop gas-light, placed about 18 inches above the counter. In Germany, the half-meter, or 26 inches, about, is the measure used, and that held in the hand of a salesman by a handle at one end of the measuring-stick. The Swedish machinist carries in his pocket a rule on which he has the English inch, and by its side the French measures; on the other side, he has the two Swedish feet, one long in use, and one ordered to be used, but never put into practice. The Swedish roads are laid out now in kilometers, and marked by iron plates, giving at each 10 km. the distance from some place, while half-way between is a sign "5 km." This division of the roadway seems to them to be fine enough, as the old Swedish mile was 6¾ of our miles, and 5 km. is a less distance.

In Germany, you never hear of the kilo, but they sell by the pound, their pound being the half of 1 kilo; this they cut up as they please into smaller weights, and you can buy half a pound of grapes or butter just as well as you can in America. It is claimed that, given the meter, all weights, etc., can be deduced from it. In theory this is very well. The most skillful workmen, however, are not yet able to make two liters of water weigh alike to the utmost point of accuracy, and the cubical liter is not used, but is converted into a circular or cylindrical vessel, with all the trouble of the problem of squaring the circle.

If a bar of ordinary forged iron be planed up to measure 1 inch square, and the bar be 1 English yard long, it will weigh 10 pounds, and the tenth of such a bar will weigh 1 pound more accurately than will the ordinary liter of water weigh 1 kilo. The English engineer, in these days of iron, knows when he uses shapes of iron rolled of uniform section that the tenth of their weight in pounds per yard gives him the area of the section, and this one admirable incident will long fix the desirability of the present unit of England and America. When we consider the interest involved, it will be seen that the population now making practical use of the English standard is greatly in excess of that using, by force, the French system. Millions of those numbered among the people who use the French system have no occasion to use any or know any system whatever save in the crudest form.

Carefully as I have considered this subject of weights and measures during the time I have been from home, I am the more confirmed in my opposition to the enforced adoption of the metric system of France in my own country, and firmly believe that those countries that have adopted it are at a disadvantage as compared with even the most imperfect of our systems. America has entered on the line of simplification of its metrology, and that is the direction that should be followed, not by any means giving up what is good, but by making what has been found to be practical better and simpler. One has not to be long in England to find out how firmly are the seemingly complicated systems of weights and measures of that country fixed with the people. They weigh by the stone and compute by the sterling currency as rapidly or more so than we do with our dollars and cents, and that because their unit is larger. The English shopkeeper knows nothing about decimals, and says, if you ask him, that he has never learned what they are. England has lately made legal the admirable standard manufactured by Sir Joseph Whitworth, and the chance of her adopting the metric system is not in the most remote degree possible.

THE HISTORY AND FUTURE OF BRITISH METAL MINING.—I.*

With thirty-five years of experience as Keeper of Mining Records, in the collection of statistics from what to us would appear a very limited area, Mr. Robert Hunt has had exceptional facilities for gathering data for so ambitious a work as that before us. The mass of material patiently culled out and carefully sifted seems to have almost overwhelmed him, and those who have no absorbing interest in the minutiæ of some unimportant locality will probably feel, as we do, that due prominence to broad general outline of his picture has suffered from a bewildering mass of petty detail. As one of the earliest industries of Great Britain, and as one with which progress there and elsewhere has been closely allied, a single sketch of the historical development of metalliferous mining in Great Britain will reflect fairly well the different stages through which mining passed before it reached that phase of decline that characterizes it to-day. Dr. Hunt explains that he was led to the inquiry how far the applications of science would facilitate the extraction of minerals when he was a member of the well-known Royal Commission, appointed in 1866, "to inquire as to the quantity of coal consumed in various branches of manufacture." To any one who has compared practice in the mines of Cornwall, for instance, with that of the continent of Europe, and with that of many sections in our country, it requires little penetration to observe how wofully behind the times English metalliferous miners are in many respects. One of our leading American mining engineers was present at one of the meetings of a local technical society, and noted with some amusement how, during a debate, a great deal of stress was laid upon an improvement just then introduced. His attention was particularly called to the great saving it effected, when he surprised his Cornish friends by suggesting that it would prove an interesting calculation to compute how much they had lost by not introducing the improvement in question twenty years ago, when every body else had done it! It was only recently that we had occasion to hear an outburst of indignation from an old Cornish mining captain, who had come here from a visit to his old home, after a long residence in one of our most prominent mining districts. He was emphatic in declaring, when the subject of the decline in mining in Cornwall came up, that that grand old mining country was getting crowded out of the race by more vigorous younger rivals, not because the mines themselves were impoverished, but because those in charge of them were unable or unwilling to cut away from old traditions and abandon old methods for more recent ones. It will be seen, therefore, that Dr. Hunt has undertaken a work in which the aggressive measures of a reformer would be most likely to produce the greatest good. We may say, in a general way, that in this respect his dissecting-knife does not cut deep enough. There seems to linger with him too much of the love of what is consecrated by age to allow him to mercilessly sweep aside what is antiquated.

Dr. Hunt has divided his ponderous volume of over 900 pages into four "books," of which the first gives a historical sketch of British mining, the second treats of the formation of mineral veins, the third is devoted to practical mining, and the fourth deals with the future prospects of

* BRITISH MINING. A Treatise on the History, Discovery, Practical Development, and Future Prospects of Metalliferous Mines in the United Kingdom. By ROBERT HUNT, F.R.S. London: Crosby, Lockwood & Co. 1884. 8vo, 944 pages, with Index and many Illustrations.

British mining. We shall take up the subjects presented in that order, gleaning the most striking notes as we go along.

Dr. Hunt, in reviewing the evidence relating to the existence of trading in tin with Britain by the Phœnicians, leans to the opinion that the source of the metal was Cornwall. He does not seem impressed with the arguments in favor of regarding the Scilly Islands as the Cassiterides of the ancients, chiefly because there are not now any traces of mineral deposits in that group. It does not appear that, prior to the invasion of the Romans, any lead or copper was mined in Great Britain, but there are many proofs that with their arrival both these metals were added to the output of the country. Pigs of lead have been found in Hampshire, Yorkshire, Nottinghamshire, Shropshire, Montgomery, and Flintshire, bearing inscriptions of Nero, Domitian, Hadrian, and Vespasian, and in some cases the letters "Ex Argent," showing that the lead had been desilverized. Masses of old slags, tools, etc., have been discovered, and in the Mendip hills, Somersetshire, old Roman excavations have been reopened centuries later. Copper, also, was the object of Roman workings, coins having been found in the mines of Llanymynech, near Oswestry, copper slabs bearing inscriptions at Anglesea, and at Caer Hen, the ancient Conovium, old workings at Copper Hill, Cwm-ystwyth, at Abergeley and other points. After the departure of the Romans, there is a long gap in the records, the only trace of the work of the Saxons being the discovery, in 1774, in a stream work at Trewhiddle, near St. Austell, of Saxon coins inscribed with dates from 757 to 901. Still, in the middle ages, Cornish tin remained the subject of traffic, and a manuscript entitled *La Practica della Mercatura* in the Riccardian Library, composed between 1332 and 1345 by Francisco Balducci Pegolotti, refers to the fact that tin was imported into Italy from Cornwall. In 1201, King John granted a charter to the tinners of Cornwall and Devonshire, and in 1305 Edward I. confirmed it, banishing at the same time the Jews who clung with great tenacity to the tin mines of Cornwall. After their exile, however, the mines languished. In 1337, a grant of the stannaries was made to Edward, the Black Prince, but in the following year the king, in the most capricious manner, seized all the tin produced, and tin mining was again at a very low ebb, and although in 1376 the tinners obtained the sanction of Parliament to the rules of Edward the First's charter, the mines remained almost neglected during the wars of the Roses. Under Henry VII. and Henry VIII., nothing was done to encourage the industry. In 1509, Parliament passed an act, intended to protect English tin miners from the competition of the Bohemian and Altenberg mines; but it was only in the reign of Queen Elizabeth that special attention was paid to tin mining. She sent to Germany and obtained the services of a large body of practical miners, who introduced a better system of mining, and more perfect processes for the dressing of ores. During the reign of Queen Anne, there was a great accumulation of tin, and the trade was very dull until 1789, when the East India Company bought a large quantity on speculation, and marketed it gradually in the East.

Many years before 1620, the manufacture of tin plate existed in Bohemia, and though the secret was well guarded, Englishmen obtained knowledge of it, and Mr. Andrew Yarrington made tin plate in an experimental way about 1625. It was nearly a century later, in 1720, that the first attempt to manufacture tin plate was made at Pontypool, Monmouthshire, by Major John Hanbury.

"THE BASIC OPEN-HEARTH STEEL PROCESS."*

By Thomas Gillott, M. Inst. C.E.

In the following account of the application of the basic, or Thomas-Gilchrist, dephosphorization process to the open-hearth furnace, the author has confined himself to his own personal experience, dating from May, 1882, at the works of the Farnley Iron Company, near Leeds. The basic Bessemer process is now well known and established, and will probably be the most extensively adopted for the production of steel in large quantities for general use; but, as in the contemporary acid processes, the Siemens furnace retains advantages for the production of exceptional qualities, and has the further capability of dealing with raw materials that are altogether unsuited for the Bessemer (basic) process.

Pig-iron most suitable for the basic Bessemer process should approximately contain, according to Messrs. Thomas and Gilchrist, "silicon, 0·5 to 1·8; phosphorus, 0·8 to 3; sulphur, under 0·3; manganese, not over 2·5 per cent;"† and in order to secure the necessary heat, the carbon would probably have to be 3·5 per cent; but in the basic open-hearth process, the proportion of heat-producing elements need not be high, and large quantities of wrought-iron scraps, which often contain 0·2 per cent of phosphorus, and are altogether unsuited for the acid process, may be converted into steel of high quality and great purity.

After unsuccessful attempts to produce a high-class steel in the acid process by the use of hematite pig for the bath, and wrought-iron scraps, or specially puddled iron made from pigs in which phosphorus was comparatively high, the author was instructed to apply to the open hearth furnace the process which Messrs. Thomas and Gilchrist had at that time just succeeded with in the Bessemer converter. As no basic bricks, excepting such as were too costly for practical use, were suitable for constructing the furnace throughout, the author consulted chemists as to materials that would be sufficiently refractory at a steel melting heat and at the same time securely isolate the dolomitic lime basin of the furnace from the silica walls above; so as to prevent that fluxing of lime and silica, and consequent destruction of the furnace, that would result from these materials being in immediate contact. He was advised that magnesia on the lime, alumina above the magnesia, and silica brick-work carried up on the alumina, would be secure; so, after some trials, bricks were made from magnesite containing 98 per cent of carbonate of magnesia, and others from bauxite of the approximate composition, silica, 15; alumina, 82; lime, 1; peroxide of iron, 2; and with these the furnace was built.

This furnace had been previously used in the acid process for from 50 to 55-cwt. charges, and was altered to suit the basic process. At the beginning, the author recognized the necessity of providing for the removal of the slags in the early stages of the process, so that the banks of the furnace might be preserved; and any phosphorus transferred from the melted portion of the charge to the slags could be withdrawn, so as to reduce the amount of purification at the later stages, and allow the heat to be better employed by reducing the covering of slag on the metal; and this provision has proved very useful.

The building of the furnace was conducted as follows: The iron bottom-plates *A* and the bridge-plates *B* are similar to those used for the acid furnace; brackets bolted to the side-plates of the furnace support the brick-work by the plate *C* at the level of the top of the lime basin, and prevent settlement of the upper brick-work in case of any shrinking of the lime basin, or fluxing in work. The metal tapping-hole and spout is at *D*, and two slag tap-holes are at higher levels *E E* on the opposite or charging side of the furnace. In other respects, the furnace does not differ from an ordinary Siemens furnace. Bricks made from magnesian lime, and of the following approximate composition: lime, 58; magnesia, 24; silica, 8; alumina and oxide of iron, 10 parts; are burnt at a full white heat, crushed, mixed with hot tar in a mortar mill, and are taken immediately to the furnace and rammed with red-hot rammers over the parts *G* on the furnace bottom-plates, wooden plugs being inserted to form the tap-holes, the parts marked *H* being walled in the same bricks, and grouted with material similar to the ramming. The isolating courses *I* and *K*, of magnesia and bauxite bricks respectively, are laid on the top of the iron brackets *C* on the sides, and across the ends of the basin over the plates *B*; and the shape of the hearth is completed by lime ramming.

The use of hot rammers is necessary to coke the tar; otherwise, the lime swells and falls to pieces in about twenty-four hours after mixing.

The building of the furnace having been completed and the furnace lighted, it will be sufficiently hot in about seventy-two hours for forming the bottom, and for this a full melting heat is necessary. Well burnt and freshly ground magnesian limestone is laid over the bottom and up the sides, with not more than 10 per cent of ground fire-brick added, so as to just flux the lining sufficiently for binding the layer forming the furnace-bottom. The wooden plugs for forming the tap-holes are burnt out, and the holes are stopped by dry lime only, or dry lime mixed with a small quantity of powdered coke. The gas and air-ports should be so arranged as to throw the flame well down on the bottom, so that the heat may be sufficient to allow of the smallest possible admixture of siliceous flux.

The furnace is then ready, and the operation is thus conducted: Fresh and well burnt lime (that used was from stone containing 98 per cent of carbonate of lime), about from one twentieth to one tenth of the weight of the pig-iron, is laid upon the bottom of the furnace, the pig is then charged, and the wrought-iron or steel scraps are put on the top of the pig, all being cold. The whole of the charge, if possible, is placed in the furnace at the beginning; feeding afterward is always avoided when the state of the furnace will admit. In three or four hours, the pig being melted, the charge will have sunk so as to enable some slag to be tapped off. The first slag is generally very fluid, and more or less so as the silicon in the pig is higher or lower; consequently the sides of the hearth are far better preserved by getting rid of the more siliceous slag at an early stage, and before the full heat is reached. In from three and a half to six hours, the time being dependent on the proportion of pig to scrap, the whole charge will be melted, more slag can be taken off if required, some lime added if the slag is very fluid, and ore with the lime, if the proportion of pig to scrap is high. When boiling has ceased and after the bath of fluid metal has been well stirred, the metal may be sampled. The samples are taken from the furnace in a ladle, cast into an ingot about three inches in diameter by 2 or 2½ inches thick, and flattened, when sufficiently cool, under a steam-hammer into a plate ¾ inch thick. This is quenched in cold water and then bent double, broken in two pieces, and the larger portion broken again. When the metal is sufficiently pure, these samples are so tough as to be scarcely, but nearly, broken through by being flattened close; the fracture is generally free from crystals, of good color, and uniform. Crystals in specks are sometimes found, but when regular as regards size, and equiangular to the naked eye as regards shape, the presence of crystals does not always indicate less purity than does their absence. Long streaks in the fracture, dark color, with little toughness, are more certain indications of the presence of phosphorus. The sample being satisfactory, the slag may be removed; but at this period, it is generally too pasty to run, therefore it is withdrawn by raking through the center door, which is placed 4½ inches lower than the two end doors. About 5 per cent of hematite pig is then charged through the end doors on the bridges, which pig when melted causes the metal in the bath to boil more or less violently for about fifteen minutes. After this, from fifteen to thirty minutes are allowed to elapse, and any excess of slag beyond what is required to cover the metal in the casting-ladle is removed, when the metal in the bath is ready for adding spiegel or ferro-manganese, and tapping. The addition of hematite pig causes a thorough agitation of the bath far beyond what can be done by stirring with an iron bar; and every analysis the author has made proves a further removal of phosphorus by the addition. There is a drawback, however, to this on account of the occasional failure of parts of the basin during the after-boil, which causes a further boiling out of the bottom or sides of the basin in the neighborhood of the failing place. Sometimes the tap-hole stopping begins to work out during the after-boil; and these accidents are generally due to some of the lime used for repairs or stoppings being imperfectly burnt; or it has been partially slacked during or after grinding. The author has tried several times to secure the quality of steel aimed at without adding pig at the end of the purification, but the results have been uncertain and irregular. In only one instance, has the author obtained evidence of re-phosphorization on adding the ferro-manganese after adding hematite pig. In this case, the sample that had been flattened, quenched, and broken tested 0·104 per cent, and the sample from the finished steel showed 0·122 per cent of phosphorus. In other cases where the two respective samples were tested for phosphorus, the reduction per cent averaged 0·016, and varied from 0·008 to 0·025 less phosphorus than the trial samples contained. When quite satisfactory, the trial samples show from 0·06 to 0·07 per cent of phosphorus.

The author has always added the ferro-manganese in the furn

* Read before the Institution of Civil Engineers.
† Journal of the Society of Arts, vol. xxx. (1882), p. 648.

as the reaction is somewhat too violent to permit of addition being made in the casting-ladle after the metal has been tapped; and a more uniform mixture is secured by adding in the furnace.

A small quantity of slag is usually left on the metal so as to cover the steel in the ladle and avoid chilling while pouring the ingots. Some of this slag is nearly always left on the furnace bottom, and is raked out at the door; and some also remains in the tapping-hole. If the slag is not removed immediately, the clearing of the tap-hole is a troublesome operation, and for this purpose a door opposite the tap-hole is absolutely necessary

After casting the metal and raking out the slag, the bottom and sides of the furnace-basin are repaired by magnesian lime, well burnt and finely ground, and any holes that may have been formed during working are carefully filled with the same kind of material. The gas is turned on to fix the lime by semi-fusion with the surface of the basin, the tap-hole is stopped, and the furnace is ready for another charge in from one hour to three hours after the cast is over. The slag adhering to the bottom of the furnace requires occasional removal by melting off with fluxes, or breaking away; otherwise, the capacity of the furnace is reduced and the level of the metal unduly raised.

The quality of metal which the Farnley Iron Company desired to produce was that which possessed the maximum ductility when cold, together with the capability of sustaining, without failure or injury, the severe tests required by the most difficult flanging and welding when hot. In this respect, the results of the mechanical tests that will be submitted are a sufficient proof of success; the chemical features will be dealt with separately. But it may here be remarked that Farnley Best Yorkshire cold-blast pig-iron has been the only phosphoric pig-iron used; and being so low in silicon and sulphur, regular in quality, and more free from sand adhering to the pig than the cheaper hot-blast irons, a large portion of the successful results obtained must be credited to the principal raw material used.

Two typical casts will now be given (229), one in which pig with a small admixture of wrought-iron scraps was worked with ore; and another (375), with less pig, more scrap, and no ore:

			Tons.	cwt.	qrs.	lbs.
No. 229. Charge 6.30 A.M.		Farnley No. 3 pig	1	8	0	0
29th June, 1882.	"	Steel scrap	0	8	2	0
	2.45 P.M.	Hematite pig, No. 3	0	2	0	0
	3.10 "	Spiegel, 18 per cent Mn	0	1	1	0
	3.25 "	Ferro-Mn, 53 per cent	0	0	1	5
			2	0	0	5

Commenced adding ore and lime at 10.30 A.M., 4½ cwt. Sommo-rostro ore, and 1¼ cwt. burnt lime; 2 cwt. of slag run off 2.40 P.M. Sample flattened, quenched, broke tough, without any crystals in fracture: 3½ cwt. of slag removed. Cast 3.28 P.M. One 15 inches square, and one 12 inches square, full ingots. 12-inch ingot hammered into a slab and rolled into a plate 8·10 by 5·4½ by ½ inch bare. Strips from plate heated red, quenched, bent cold, and closed to ⅝ inch between folds without crack. The plate, after annealing, was bent to 2 feet 9 inches diameter,

Fig.1.

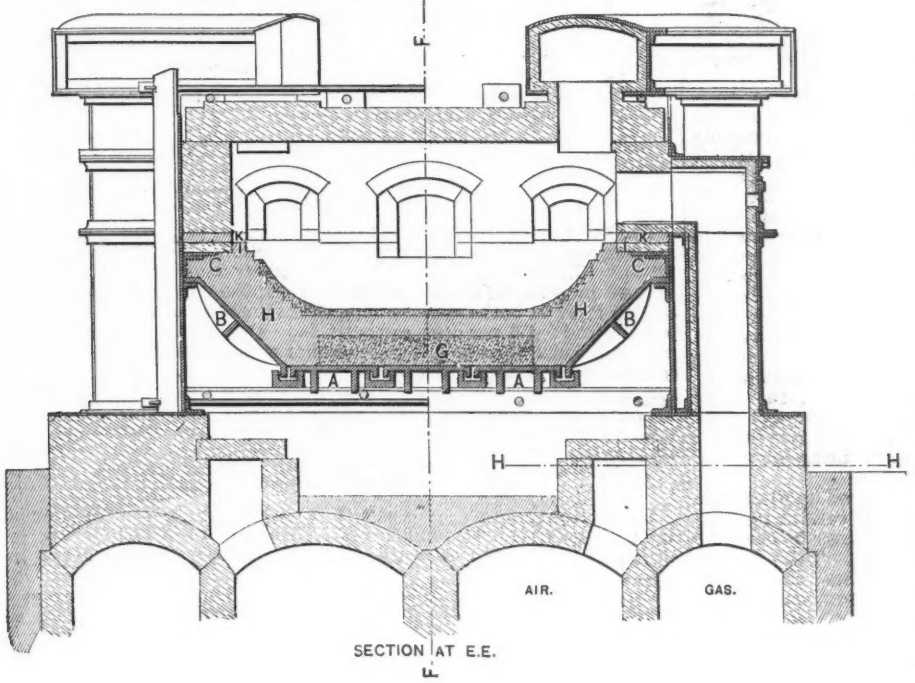


Fig.3.

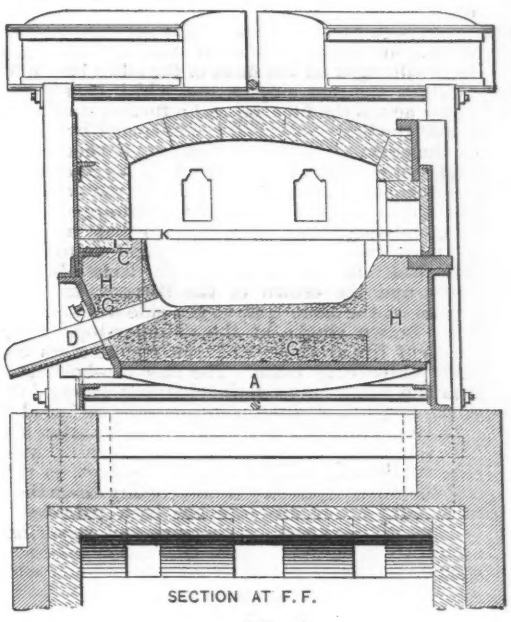


Fig.4.

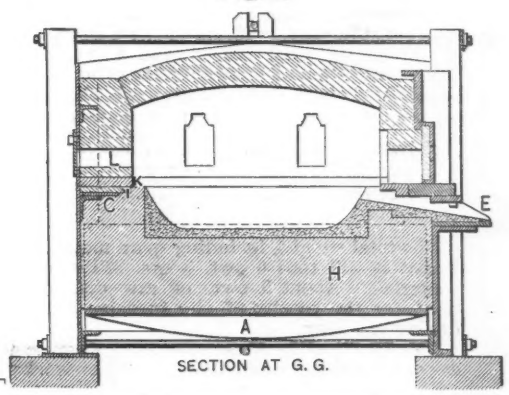


Fig.2.

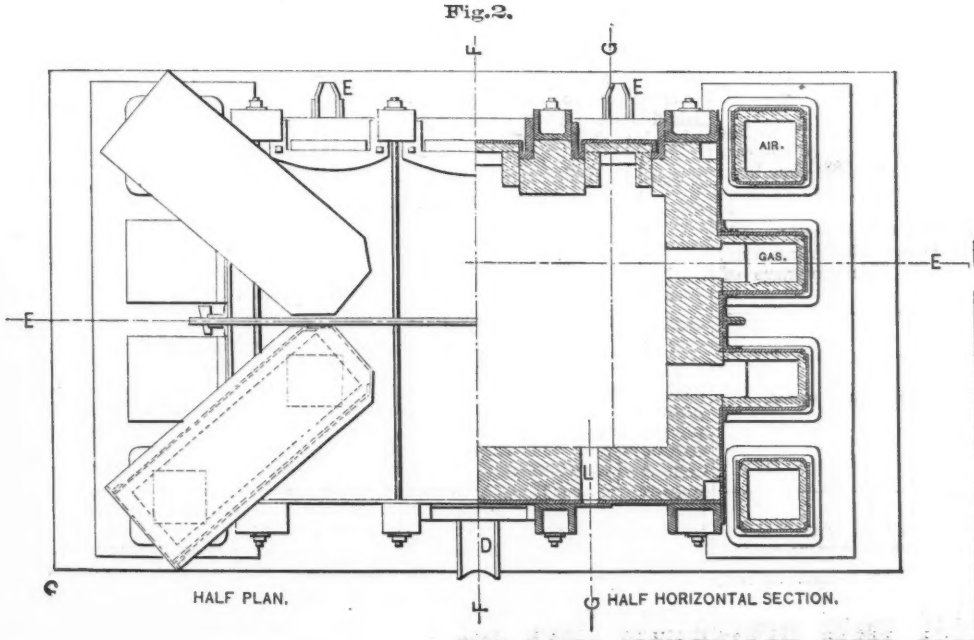
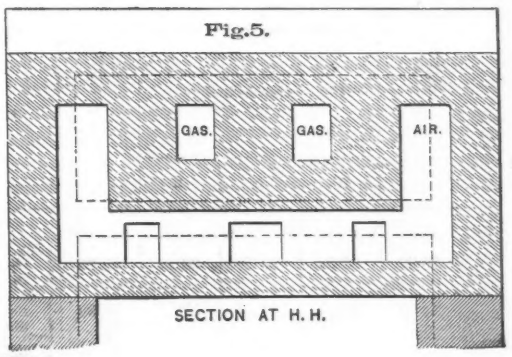


Fig.5.



THE BASIC OPEN-HEARTH STEEL PROCESS.

welded longitudinally, and flanged at both ends without crack or failure. [Tests and analysis are given afterward.]

			Tons.	cwt.	qrs.	lbs.
No. 375.	Charge 6.30 A.M.	Farnley No. 3 pig	0	17	0	0
	"	Common wrought-iron scrap	0	6	0	0
	"	Wrought turnings	1	2	0	0
	1.20	Hematite, No. 3	0	2	0	0
	..	Ferro-Mn, 71 per cent	0	0	2	19
			2	7	2	19

4 cwt. of slag taken off, and about 1¼ cwt. left on metal. 1.10 P.M., sample flattened, quenched, broke very tough; no crystals in fracture.

	Ton.	cwt.	qrs.	lbs.
Cast 2.25 P.M., 1 ingot, 19 inches square	1	17	0	26
1 piece, 12 inches square	0	5	2	14

Hot and cold tests satisfactory. Phosphorus in finished steel = 0·056 per cent.

The design of the furnace is in several respects unsatisfactory for basic work. When lime is added during the melting, small quantities, carried by the draught on the faces of the silica bricks forming the ports, rapidly flux the gas and air-passages, which causes a siliceous liquid to trickle down across the furnace, and a further fluxing of the lime basin on the top of the bridge-plates *B* is occasioned by the droppings from the faces of the ports. The author has not yet succeeded in making a lime brick that will withstand the current of gas and air and the cooling down of the furnace after tapping. Under the combined effects, disintegration of the lime brick occurs, and any failure of the ports must be repaired at once—for which the furnace has to be cooled down. Usually the ports need repair after from eighteen to twenty-one days' work; the side wall on the tapping side lasts about twice as long as the ports, and the crown of the furnace in the center requires minor repairs at the same time as the side walls. Showers of minute sparks, with brown smoke at the chimney-top, are given off in the later stages of the process; and the regenerators require cleaning out after sixty or seventy casts. The slag tap-holes in the furnace used are too near the jambs between the charging-doors; but from the arrangement of the furnace, no other position could be found for them.

To remedy these inconveniences, the author has designed another furnace (Figs. 1 to 4) in which the gas and air-passages are carried up outside the hearth and in separate casings, so that they may be changed and the inlets repaired without cooling down the furnace. This arrangement of gas and air-ports has been patented by Messrs. Hackney & Wailes. Three doors for charging and repairing, and two slag-spouts, are provided on the opposite side to the tap-hole for the metal, and two sight-holes *LL*, for inspecting the furnace while working. The other reference letters apply to the same parts as the furnace before described.

Owing to the very soft quality of steel produced, the heat required is nearly as great as Sheffield silica bricks are able to withstand; so long as the slag can be kept clear of the magnesia and bauxite bricks, they have been satisfactory, and, but for their great cost, magnesia bricks would doubtless be much better than silica bricks for the faces of the ports. The waste is not excessive; taking the more recent work without charging or crediting skulls and pit-scrap, the results are as under:

Casts 302 to 408 (inclusive).

Materials charged.	Tons.	cwt.	qrs.	lbs.
Farnley pig-iron	90	8	0	0
Hematite "	9	13	2	0
Iron and steel scrap	130	5	0	16
Ferro-Mn	4	14	2	14
	235	1	1	2

The total weight, including spare metal, of ingots produced from the above is 219 tons 6 cwt. 3 qrs. 26 lbs., or about 93 per cent of the raw materials. About 9 cwt. of raw dolomite per ton of ingots has been used for the repairs of the furnace, as deduced from the work done during one year.

The following mechanical tests are from casts of the numbers annexed; nearly all the plates have been for boiler-work requiring difficult flanging; excluding some three or four accidental casts, they are a fair average of the quality of steel:

Breaking-weight per square inch.	Elongation in inches. 10	8	2	Reduction of area.	Description of piece tested.
Tons.	Per cent.	Per cent.	Per cent.	Per cent.	
25·89	25·00	27·50	53·12	55·75	No. 229. Plate from ingot 12 inches square; size, 2·015 inches by 0·46 inch.
22·29	31·25	34·06	53·12	62·90	No. 242. Axle from 15 inches square ingot; billet turned to 1-inch diameter.
24·96	35·00	37·50	62·50	62·73	No. 245. Plate from 12 inches square ingot; size, 2·03 inches by 0·37 inch.
23·00	30·00	31·25	62·50	63·48	No. 246. Plate from 15 inches square ingot; size 1·99 inch by 0·755 inch.
24·16	27·50	30·47	.....	56·53	No. 289. Plate from 15 inches square ingot; size, 2·035 inches by 0·59 inch.
23·92	28·12	34·18	59·37	58·25	No. 304. Plate from 19 inches square ingot; size, 1·52 inch by 0·68 inch.
25·98	24·37	26·56	40·62	50·00	No. 305. Billet from axle from 19 inches square ingot, turned to 1 inch diameter.
26·68	23·75	25·00	43·75	46·01	No. 313. Plate from 19 inches square ingot; size tested, 1·765 inch by 0·69 inch.
26·68	26·25	28·47	53·12	49·77	No. 315. Plate from 2 feet 3 inches by 1 foot ingot; size tested, 1·52 inch by 0·705 inch.
24·07	28·75	31·25	50·00	48·93	No. 345. Plate from 19 inches square ingot; size tested, 2 inches by 0·565 inch.
24·76	27·99	30·62	53·12	55·49	Average.

All the test-pieces were parallel for a length of 11 inches, plates being machined on the edges only; a space of 10 inches long was in every case divided into 10 equal parts. The cases in which a length of 2 inches adjacent to the fracture showed a greater elongation per cent than the contraction of area per cent are explained by the concave shape of the ruptured edges, so that when the pieces were joined for measuring the elongation, the fractured edges were in contact at the sides only; and the true elongation is consequently less than the distance between the points, from which the percentages in the table are calculated; this only occurs with rectangular sections.

The pig-irons used were of the following composition:

Analysis by J. O. Arnold, F.C.S., Iron-maker.

	Farnley.	Hematite.
Iron	93·311 (by difference)	93·194
Graphite	3·250	3·798
Combined carbon	0·392	0·410
Silicon	1·245	2·285
Sulphur	0·013	0·004
Phosphorus	0·601	0·058
Manganese	1·188	0·199
Titanium	.....	0·152
	100·000	100·000

The wrought-iron scraps used were not all of high quality, and would average not less than 0·2 per cent of phosphorus; consequently charges 229 and 375, before given, would respectively contain 0·46 and 0·35 per cent of phosphorus at the commencement, the samples taken from the casting-ladle in both cases showing that the phosphorus had been reduced to 0·067 and 0·056 per cent respectively. Other phosphorus tests from casts for which the charges were similar to 375, the selection being made from a number, are as follows:

Casts, No.	242	271	273	274	275	276	283		
P. per cent.	0·065	0·078	0·090	0·097	0·092	0·086	0·097		
Casts, No.	287	300	301	305	335	336	340	348	351
P. per cent.	0·076	0·083	0·082	0·050	0·083	0·076	0·064	0·079	0·053
Casts, No.	352		360	375		382		383	402
P. per cent.	0·060		0·071	0·056		0·055		0·056	0·062

All the foregoing phosphorus tests were from ladle-samples taken after tapping, except No. 305, which was drilled from a finished forging; some of those given are of casts where the phosphorus was expected to be somewhat high.

The order of removal of phosphorus is evidently different from that which it has been shown to be in the Bessemer converter. In the latter process, it has been proved that the phosphorus is not eliminated to any great extent until the carbon and silicon have almost disappeared; consequently the author was scarcely prepared to find so small an amount as 1·974 per cent of phosphoric acid in the final slags of charge No. 229. He therefore took a sample of slag from No. 301, which had been run off after the pig was fluid, but before the scraps were melted, and this sample when tested afforded 5·087 per cent of phosphoric acid.

Although samples of metal have been taken when the whole charge was melted, and before boiling began, the phosphorus in the melted metal was always found to be much lower than the charge was known to contain originally, proving that the elimination of phosphorus in the basic open-hearth process commences in the early stages.

With respect to the removal of sulphur, the results were not so encouraging. The following table gives three tests: (*a*) when the charge was all melted; (*b*) from the flattened test sample; and (*c*) from the finished steel. They were taken from casts in which scraps known to be high in sulphur were purposely tried:

No. of cast.	Sulphur. Per cent. *a*	*b*	*c*	Phosphorus. Per cent. *a*	*b*	*c*
213	0·226	0·192	0·218	0·114	0·066	0·070
214	0·230	0·182	0·172	.....	0·039	0·041
225	0·200	.....	0·189	.....	.....	.....
227	.....	.....	0·197	.....	.....	.....

None of these charges was satisfactory under the hot tests.

The evolution of sparks and brown smoke has been before referred to, and as the author in several instances was unable to balance the phosphorus in the charge with that contained in the slags added to the phosphorus left in the finished steel, he took samples of the deposits in the regenerators. One sample from the gas regenerator contained 4·741 per cent, and another sample from the air regenerator gave 2·995 per cent of phosphoric acid (P_2O_5), the other constituents being SiO_2, Fe_2O_3, CaO, and MnO. These deposits appear to indicate that some of the phosphorus leaves the furnace otherwise than with the slags.

Three analyses of finished steel are furnished from charges that have been already given in detail: one sample (229) was taken by a sample-spoon from the casting-ladle, but the other two, Nos. 245 and 345, both similar charges, were drilled from the specimens tested in the machine, the tensile strengths, etc., of which are included in the table of tests.

	No. 229. Per cent.	No. 245. Per cent.	No. 345. Per cent.
Carbon	0·240	0·140	0·140
Silicon	trace	trace	0·004
Sulphur	0·060	0·037	0·074
Phosphorus	0·067	0·056	0·050
Manganese	0·526	0·191	0·598

A quantity of slags from pig and scrap charges similar to Nos. 245 and 345, all being taken from those run off before the final additions and ground up, gave an analysis SiO_2 17·830, and P_2O_5 2·726 per cent; and a complete analysis of slags tapped out of the furnace with the metal, and consequently taken after the additions of hematite pig and ferro-manganese, is given below:

	Per cent.		Per cent.
P_2O_5	0·806	CaO	39·700
SiO_2	13·640	MgO	11·750
Fe_2O_3	1·370	MnO	8·762
FeO	18·571	S	0·119
Al_2O_3	2·235	Alkalies and loss	3·047
			100·000

The author has purposely omitted the question of cost; but it may be

stated that the process is more expensive as regards furnace repairs, and greater attention is required in working, although the number of men employed at the furnace is not greater than required by the acid process. The preparation of the material for repairs, namely, calcining and grinding dolomite, and burning limestone for adding, is not a part of the duties of the melters, and involves greater expenses than those for corresponding work in the Siemens or Siemens-Martin processes.

For the production of exceptionally soft steel of great purity, and the utilization of much wrought-iron scrap and certain kinds of phosphoric pig that in the present acid processes are useless for good steel, the basic open-hearth process offers peculiar advantages, and will doubtless be further developed in the future.

WEAR OF STEEL RAILS.*

By —— Couard.

A great number of measurements have been taken of the wear of steel rails on the Paris-Lyons-Mediterranean Railroad since 1874, on straight and level lines, inclines, and curves, and in stations and tunnels. The present article is devoted to the consideration of the results of observations on the wear of steel rails on straight and level sections of the way. Rails delivered from seven different steel-works had been laid, and from the results of their wear it appears that the rate of wear of rails of the same manufacture was nearly the same for various sections of way. The following are the general results for successive periods of service:

	Vertical wear per 100.000 trains.	Trains per millimeter of wear (1-25 inch).
1877-80	0·922 millimeter, or 0·0363 inch.	108,400 trains.
1880-81	0·927 " " 0·0365 "	107,500 "
1877-81	0·914 " " 0·0360 "	109,500 "

It is deduced that, in round numbers, the wear of the rails is at the rate of 1 millimeter, or $\frac{1}{25}$ inch, per one hundred and ten thousand trains. The gross tonnage-weight of trains passed over the rails has also been recorded, and it appears that the wear is at the rate of 1 millimeter, or $\frac{1}{25}$ inch, per 28,200,000 tonnes, or about 27,800,000 tons.

On the question whether the gross tonnage, as is usually accepted, or the number of trains, is the preferable measure for the regular wear of rails, the author shows from the tables of wear of rails that the coefficient of wear varies much more widely, in terms of gross tonnage, than when taken in terms of number of trains, and he concludes that the number of trains is the preferable measure. He adduces evidence in support of this conclusion from the wear of iron rails on different sections of the line, of various traffic, and also from the paper of Mr. Price Williams, On the Economy of Railroad Working, read at the Institution of Mechanical Engineers.†

For an assumed total wear of 10 millimeters, or about $\frac{2}{5}$ inch, the corresponding number of trains is one million one hundred thousand.

It appears, from the tables of wear, that the coefficient of wear diminishes with the wear; that is, that the rails wear more slowly for the same traffic, after having been laid for some years. For instance, on the section of way between Melun and Bois-le-roi, in the course of the period 1874 to 1883, the number of trains per millimeter of wear increases from twenty-nine thousand six hundred to seventy-seven thousand five hundred trains. The decreasing rate of wear here signified is explained, no doubt, by the wearing down of the upper part of the rail into a flatter section, and the increasing width of surface subject to wear.

It is remarkable that the wear of the outer rail of each line of way is more rapid than that of the inner rail, to the extent of from 20 per cent to 30 per cent. There is a corresponding difference against the outer rail, in the percentage of fractures of rails. These differences are ascribed to the less efficient support of the sleepers at the outer sides of the way than in the central portion, between the two lines of way.

The durability of rails made of Bessemer steel is shown to be much superior to the rails of Martin steel. The hardest rails are found to endure the longest.

ARTIFICIAL GRAPHITE.—Dr. Aron exhibited, at the meeting of the Berlin Electrical Society, various specimens of vegetable carbon, which were made conductors and rendered almost incombustible by energetic and prolonged heating in a vacuum or in a neutral atmosphere. These properties are so much like those of graphite that the product may well be called artificial graphite, although it is not crystalline. The experiments show that if, as has been affirmed, the presence of hydrogen in graphite determines its combustibility, this can be true only of combined hydrogen; for carbon that has been calcined and made incandescent in an atmosphere of hydrogen is no more combustible than before.

FIRE RISKS IN MACHINE-SHOPS.—Establishments for building steam-engines and boilers are, in the construction-shops for the former, probably the best type of the machine-shop that exists. Here the fire risk is purely a machine-making risk; and while flame occurring would in small degree destroy the substance of the machine, it would decrease its adaptability to its purpose. The danger from friction is considerable. Most of these works, however, have boiler-shops attached that form the weak spot of the place, unless placed at considerable distance, when the boiler-shop could and should bear its own burden of many forge fires and red-hot bolts flying about in all directions, held by tongs in the hands of boys. A foundry is, however, much more likely to be immediately adjoining a steam-engine shop than a boiler-shop would be. It would, therefore, be correct to consider most of the establishments as subject only to this foundry risk. It is rarely that a pure machine-shop of any considerable size is entirely isolated from one or the other of the two adjuncts. The Chronicle Fire Tables give 2·30 per cent per annum as the proportion of foundries and machine-shops taking fire in the United States during the nine years of observation, 1875–1883 inclusive.

* Abstract of a paper in *Revue Générale des Chemins de Fer*, March, 1884, p. 105. From the proceedings of the Institution of Civil Engineers of London, edited by James Forrest, Secretary.

† Institution of Mechanical Engineers, Proceedings, 1879, p. 96.

THE PRICE OF DYNAMITE IN MEXICO.—A correspondent writes to the editor of the *Mining World and Engineering Record* as follows: Since the expiration of the patent of Nobel for the manufacture of high explosives, the world has experienced a gradual fall in the price of dynamite, but probably nowhere has it been so marked as in Mexico, where it can now be had at the same price as in England. Four years ago, the writer bought dynamite in the City of Mexico at $50, equal to £10, per case of 50 pounds, with 100 caps given over; but to-day, with American and German competition, it can be had at $12, equal to £2 8s., per case of 50 pounds net. This will be at the rate of $480, or £96, per ton of 2000 pounds; but deducting the rate of exchange between here and England, which is about 15 per cent, it will be $408, or £30 6s. 4½d., per ton of 2000 pounds, or 40 cases. It must also be remembered that with each case of dynamite 200 caps are given over, or 8000 caps per ton. Of course, as a consumer of this article, it is not my business to inquire what the manufacturer's profit or loss is. I can only say such tremendous competition as we have here is a great boon to the mining industry. To-day, I called on the representatives of an American dynamite firm, and asked for future prices. They told me they could only state that their instructions were, to undersell all other firms, and especially European companies, so that we may expect still lower prices. In fact, dynamite can now be had at almost any price; for if one firm will not sell it, another will. The writer adds in a postscript: I have at this moment been offered dynamite, No. 1 grade, at $400, or £80, a ton, with 8000 caps. This will be in English money £68 a ton.

FURNACE, MILL, AND FACTORY.

The Kensington Iron-Works of Lloyd & Sons, Pittsburg, Pa., have been started up again. Since the first of last June, the works were only one week in operation. The stop just ended has been longer than any within the last fourteen years.

Reports from Ohio state that the Mahoning Valley Iron Company, Youngstown Rolling-Mill Company, and Cartwright, McCurdy & Co. have their rolling-mills running double-turn. Andrews Brothers & Co.'s finishing mills are on double, and their other departments are running single. The mills of Brown, Bonnell & Co. are run to about one half their capacity. The Westlake rolling-mill at Warren is still idle.

Owing to the continued depression in the iron business, it was decided at the annual meeting of the Abbott Iron Company to suspend operations until prices become more remunerative. The mills, which are located in Canton, Maryland, closed October 4th.

The suit of the National Tube-Works of McKeesport, Pa., to recover from the Baltimore & Ohio Railroad Company $26,700, excessive freight charges paid by them under protest since 1875, has been decided in favor of the railroad company.

Furnace No. 1 at the rolling-mills north of Joliet, Ill., burst October 11th, setting fire to the stock-house, and consuming it, with several cars and other property. The loss is heavy.

The improvements at the Cumberland Steel-Works for the Crown & Cumberland Steel Company are progressing as rapidly as the circumstances will permit. The smelting is now in operation, and the product is shipped for use at Demmler, near McKeesport, where the other mill belonging to the company is in operation. The entire works at Cumberland, Md., are expected to be in operation in December.

The Westinghouse Machine Company closed down its works October 11th for three weeks. Extensive repairs are to be made.

The nail machines of the American Iron Works, Jones & Laughlins, Pittsburg, Pa., have been started after an idle term of six weeks.

The Vulcan Iron-Works, Wilkes-Barre, Pa., are building an engine and a 25-foot ventilating-fan for the Pocahontas mine, in Virginia.

Charles Kellogg, formerly President of the Kellogg Bridge-Works, of Buffalo, New York, it is reported has closed a contract with a New York syndicate to furnish 50,000 tons of steel pipe, to be of 36, 40, and 48 inches diameter. The delivery is to begin within six months, and the contract to be filled within two years. The pipes will be manufactured by a new process, for which application for patents, both American and foreign, has been made. The total amount of the contract is $4,000,000.

The Standard Nut Company, at Pittsburg, Pa., closed down its works October 13th because the employés refused to accept a reduction of 20 per cent in their wages. The works are controlled by Oliver Brothers & Phillips.

The Kingston (Ontario, Can.) Lead-Works have, it is said, orders on hand which will keep all hands employed until the new year. Up to date, something like 100 tons have been smelted and sold to Montreal houses.

The Wabash rolling-mill, at Terre Haute, Ind., which has been practically idle all summer, resumed work with a full force October 13th. Two hundred men are employed.

The North Chicago Boiler and Machine Company has been incorporated in Illinois with a capital stock of $50,000. Incorporators, John V. Colby, Alexander Shield, and Peter Simpson.

At the car-works of the Harlan & Hollingsworth Company, as well as at the large establishment of the Jackson & Sharp Company, at Wilmington, Del., nearly the usual complement of men is employed. At both places, a large order for the Mann boudoir cars is filling.

The Monocacy Furnace, at Reading, Pa., was sold at sheriff's sale, October 11th, to the Philadelphia & Reading Railroad Company for $19,000, subject to a mortgage of $105,000.

The terra-cotta works of Hudson & Shoemaker, at Wyoming, Pa., were burned October 13th. Loss, $20,000. Fifty persons are thrown out of employment.

The machinery for the plant of the Butte (Mont.) Gas, Light, and Coke Company has been purchased in Chicago, and shipped to Butte.

Recent orders for air-compressors, double hoisting-engines, and large pumping-engines keep the Morris County Machine and Iron Company, of Dover, N. J., running over-time. It makes the equipment of iron and coal mines a specialty.

Messrs. Otis Brothers & Co., Nos. 92 and 94 Liberty street, New York, report that they have just closed a contract with the Youghiogheny Coal Company, of Pittsburg, for one of their 10 by 10 "New Otis" hoists. This engine is to operate at the company's coal-bank, for its tipple. Messrs. Otis Brothers & Co. have closed a contract with the Glamorgan Iron Company, for a hoisting-engine for the furnace now undergoing alterations.

The store of Wardwell & Hinckley, of Chicago, Ill., dealers in machinery and engines, was closed October 13th by the sheriff. Liabilities, $25,000; assets, $18,000.

The new Henderson process of making steel, which is controlled by a dozen leading iron firms of Easton, Pa., was successfully tested October 14th at Birdsboro'. The blooms rolled well. The sheets were then cut into nail plate, and

iron and steel nails of excellent character were manufactured. The expectation is, that it will take the place of hammered and rolled iron altogether.

The Whittier Machine Company has attached the property of the Cold-Blast Refrigerator Company of Boston, Mass.

George D. Roberts, of this city, has filed a judgment against the Manganese Iron Ore Company for $2165.83.

RAILROAD NEWS.

A collision occurred October 12th near Hunker's station, on the Pennsylvania Railroad, between a long train of coke-cars and an empty freight train, setting fire to the coke train. One man was killed and another seriously injured.

The order of the Pennsylvania Railroad Company cutting off the trains of the Baltimore & Ohio road, between Baltimore and New York, which was to take effect October 12th, has not been enforced. The impression is, that the Pennsylvania road will await the decision of the courts in the injunction cases, before taking further action.

Judge Dealy, of the United States Court, Portland, Oregon, has decided that the Northern Pacific Railroad is bound by its 93 years' lease of the Oregon Company at $140,000 a year.

The first train on the Pennsylvania Schuylkill Valley Railroad reached Reading October 11th, and communication on the new road between that point and Philadelphia is now complete.

The receivers of the Philadelphia & Reading Railroad and Coal and Iron companies have filed their seventh report in the United States Circuit Court at Philadelphia, Pa. The account of the railroad company shows a balance carried over on August 1st, of $212,983.13. The receipts from tolls, merchandise, including miscellaneous receipts, amount to $2,915,399.03, and the receivers' certificates on account of wages $130,000, which, added to the receipts from other sources mentioned in the account, makes a total of $3,532,586.09, from which there is deducted $1,111,209.71 for wages and salaries, which, with outlays for interest, expenses, etc., leaves a balance of $226,532.24 on hand. The Coal and Iron Company's account shows a balance of $34,708.73 brought over. The receipts from coal sales were $1,502,208.18, which, added to the other receipts, makes a total of $1,572,319.92. The amount paid out for wages and salaries amounted to $557,952.91, which, with the amounts paid out for materials, supplies, interest, and other outlays, leaves a balance on hand of $34,926.69.

In the United States Circuit Court, at Philadelphia, Pa., application has been made in the Dinsmore suit to appoint a day to hear the closing argument. The court fixed Monday, October 27th, at Philadelphia.

The Chicago, Burlington & Quincy and the Atchison, Topeka & Santa Fé roads have inaugurated a new line, to be known as the Pacific Coast Fast Freight Line, from Chicago to all points in California, New Mexico, and Arizona. The scheduled time from Chicago to San Francisco is nine days.

LABOR AND WAGES.

The Federation of the Trade and Labor Union Convention closed its sessions at Chicago, Ill., October 10th. The election of officers resulted as follows: President, W. W. McClelland, of New York; Secretary, Gabriel Edmouston, of Washington; Vice-Presidents, Joseph W. Smith, of Springfield, Ill.; Richard Powers, of Chicago; J. O'Sullivan, of Philadelphia; Frederick Blend, of Evansville, Ind.; William Bodgen, of Cincinnati; Joseph Bonnard, of Milwaukee; Treasurer, Robert Howard, of Fall River, Mass. The convention then adjourned to meet in Washington on the second Tuesday in December, 1885.

At D. W. C. Carroll & Co.'s boiler-works at Pittsburg, Pa., a ten per cent reduction in the wages of their skilled employés took effect October 13th. The men accepted the reduction.

Philip Dorner, of Pittsburg, Pa., is said to be under contract with the Hocking Coal Company, of Ohio, to break up the strike in Hocking Valley by supplying experienced miners. He is to get $5000 if he succeeds in the undertaking. Already he has taken a large squad of men of all nationalities to the mines and put them to work. The strikers were evicted from their houses. The men sign an agreement to work for 50 cents a ton, 30 cents cheaper than the strikers received. Dorner is now in the region managing the men. He broke up the strike among H. C. Frick & Co.'s miners three years ago.

The coal miners in the Belleville District, Illinois, have demanded of the operators a uniform price of 2 cents a bushel for digging coal. Present prices range from 1½ to 2 cents. They also decided to suspend work one day in each week as a means of maintaining prices.

Cofrode & Saylor, of the Pottstown (Pa.) Bridge-Works, have announced a reduction of 20 per cent in the wages of their employés. This brings the wages of the laborers down to $1.04 per day.

The coal trades' tribunal at Pittsburg, appointed to fix the mining rate for the ensuing six months in the railroad mines, met October 13th, and discussed the matter, but came to no conclusion.

The trouble at the Riverton (Ill.) coal mines between the imported laborers and the old miners is in course of settlement without violence.

COAL TRADE NOTES.

COLORADO.

Work on the Colorado Coal and Iron Company's new mines at Crested Butte is progressing. Coal was struck October 3d.

A new coal vein only nine miles from Grand Junction, Gunnison County, is opening, and will be worked to supply the home market. It is of a superior quality, and easily obtained.

KENTUCKY.

It is said that Taylor & Crane and the firm of Jones & Brother, of Shoals, Ind., have purchased 10,000 acres of land in Brethett County, for over $1,000,000. The land is in the richest mineral section of the State, and is crossed by veins of cannel coal, besides abounding in other minerals. The land is seventy-five miles from a railroad, but a new line has been projected and will soon be built near the property.

MARYLAND.

The work at the several mines in the immediate vicinity of Frostburg has been rather slack the past few days, says the Pittsburg *Telegraph*. The Borden drift and the Alleghany mine have done the least work this summer. The Blaen Avon mine is, according to capacity, doing about as well as any of the mines around here. There is no reason to complain at the consolidation mines, Alleghany not excepted. These works have kept their mines reasonably engaged all summer. The Miller and the Midland mines are akin to the Borden Drift and Alleghany. The Ocean New Slope mine of the Consolidated Company, located about four miles below town, is becoming the star mine of the George's Creek Valley. Preparations are making to sink a pump-shaft a short distance from the slope. It is intended, as the headings are driven and more room made, to remove some of the men from the other mines into the new slope.

OHIO.

There is nothing new to note in mining affairs in and around Steubenville. The Market street shaft is running steadily, other pits are doing but little.

Five of the extensive coal mines of the Columbus & Hocking Coal and Iron Company were found to be on fire October 12th. Of the burning mines, four are located at Straitsville, and one at Carbon Hill. The mine of the Consolidated Company at Sand Run has also been fired, and Shoemaker's hoppers, near Nelsonville, have been destroyed; causing a loss of from $5000 to $8000. By continual exertions with fire-engines and by stopping all draught to the boring mines in the Hocking Valley the operators have succeeded in stopping the flames in all but one. This one is located at Carbon Hill, and the fire has gained such headway in the center of the mine that it is thought no effort will avail against it. The Columbus & Hocking Coal and Iron Company advertise that they will pay a reward of $10,000 for the arrest of the guilty parties. No further demonstrations have been made by the striking miners. An effort is making at Columbus to secure systematic donations for them during the fall and winter.

PENNSYLVANIA.

ANTHRACITE.

The fire at the Henry Clay mine, at Shamokin, which broke out recently, has been extinguished. The loss is supposed to be heavy.

The Lehigh Valley Coal Company has leased the Wyoming colliery from the Wyoming Valley Coal Company. It is said that this takes away from the Lackawanna the transportation of about 400,000 tons of coal a year.

Five workingmen's clubs of Philadelphia have organized what is known as the United Coal Club. The organization numbers 2000 members, and its purpose is to secure the best coal for the least money. The price charged by the retailers for a ton of coal was $6.50. The organization is able to purchase it and have it delivered in their cellars at $5.45 for a ton of 2240 pounds. Any citizen can join the club, and even half-tons of coal will be sold at the same rate.

The Philadelphia *Daily Record*, which recently announced that it would fill orders for coal at $5.75 a ton, the price demanded by the Retail Coal Dealers' Association being $6.50, has recently filled orders for 4923 tons. There are indications that the retail dealers will be forced to reduce rates.

It is reported that the Lehigh Valley Coal Company is about to lease the Wyoming colliery from the Wyoming Valley Coal Company. The action has not been officially announced, but it is said that the arrangements will be consummated at an early date. The Wyoming colliery is situated about two miles above Wilkes-Barre. The colliery at present employs about 500 men and boys.

A heavy fall of top rock took place in the Red Ash mine October 10th, killing two miners.

The discovery of a vein of anthracite coal in the Alleghany tunnel, on the line of the Pennsylvania Railroad, is reported. The vein is about twenty inches thick.

A tunnel from the south to the north dip, or from the old Taylorsville colliery, to Glendower, in the Heckscherville Valley, has just been finished.

Valuable veins of coal have been discovered on the tracts of the Union Company, near Shamokin. Test-holes were driven 400 feet deep with diamond drills, and four veins of good coal, varying from five to eight feet, were found.

COKE.

The Keystone Coal and Coke Company, at Roy, Butler County, has closed a contract for the erection of a coal-crusher and washer, with capacity for 250 coke-ovens, to be completed by the first of November.

The use of sulphur water, necessitated by the drouth, at some of the coke-works in the Connellsville region, has affected the quality of coke somewhat, and furnace-men are loud in their complaints. One furnace firm refused 40 cars, and had them returned to the shipper.

At the Donnelly Coke-Works, a six-inch artesian well has been put down 220 feet, and a strong stream of water struck, amply sufficient to supply the works, and also keep Mayfield going.

NATURAL GAS.

Quite a number of new gas-wells are drilling in the vicinity of Pittsburg. J. M. Guffey & Co., contractors for the Westinghouse Company, will begin drilling four new wells, three in the Tarentum territory, about 25 miles from Pittsburg. The Springdale Gas Company will start drilling a well near Springdale, and several other wells will be started soon. The Guffey well, on the Perrysville plank road, is down 1900 feet, but the company expects to drill at least 2500 feet before reaching gas. The Westinghouse Company has the exclusive right to furnish natural gas to Sharpsburg and Etna boroughs. Messrs. Guffey and Gillespie have been looking up the right of way for the pipe lines through the farms along the Alleghany, and have made that matter satisfactory.

The Wilwood Company, of Pittsburg, has been incorporated with a capital of $10,000, for the purpose of mining for natural gas, oil, and other mineral substances. The directors are Ralph Bagaley, George I. Whitney, John H. Lippincott, Robert Arthurs, and Charles B. McLean, all of Pittsburg.

Ford & Nelson have contracted for a pipe line from the McGuigan well to Pittsburg, and E. P. Hukill has made arrangements to put one down from his gas property in the southeast part of the Murraysville region.

The drill at the Morton gas-well on Four Mile Run, one and a half miles east of Laughlin's station, has not yet penetrated into the gas sand. The drill has penetrated 1604 feet, and is now supposed to be within a few inches of the sand.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

Wages have been reduced at Bisbee to $3.50 a day for miners working above water-level. The old rate, $4 a day, is received by those working below.

COPPER QUEEN.—The mine has furnished a very unique specimen of silver ore that represents a cup eight inches in diameter, from the center of which rises a perfect representation of a mushroom in almost pure silver, about three inches in hight. The specimen is to be taken to the New Orleans Exhibition.

TOMBSTONE DISTRICT.

It is learned that a dividend of 20 per cent will be paid by the assignee, Mr. Stiles, to the creditors of Hudson & Co, of Tombstone, on or about October 1st.

GILDED AGE.—The suit of J. J. Anderson *et al. vs.* Edward Field *et al.*, which has been hanging fire in the district court at Tombstone for a long time, has been dismissed at costs of plaintiff. The suit involved the title to this mine.

PINAL COUNTY.

J. D. Reymert's new concentrating mill, at Pinal, has been completed and started up.

OLD GLOBE.—Operations with the diamond drill have been resumed and are progressing satisfactorily. One smelter has been temporarily shut down, but will be blown in again soon. The run made by the two 30-ton furnaces gave an output aggregating 401 tons of copper bullion.

YAVAPAI COUNTY.

UNITED VERDE.—The report that the company had collapsed has been denied. The company is now receiving the machinery for an additional furnace from Messrs. Fraser & Chalmers.

CALIFORNIA.

FRESNO COUNTY.

GOLD QUARTZ MOUNTAIN.—Theodore G. Betty, A. V. Greene, and G. F. E. Brinckman have commenced an action against William R. de Freese, S. Mattingly, and others, to secure an accounting of the sale of this mine. It is alleged that De Freese, the owner of the property, contracted with Mattingly to give him

all over $200.000 he could obtain for the mine, and that Mattingly contracted with plaintiffs to divide the commission with them if they secured a purchaser. It is alleged that the mine was sold for $630,000, and that no part of it has been paid to plaintiffs.

MONO COUNTY.

KENTUCK.—We give the following as an example of the lavish use of figures by some of our Western exchanges: The late strike in the Kentucky mine, Sweetwater, is estimated at from $250,000 to $1,500,000.

BODIE DISTRICT.

Reports for week ended October 6th:

BODIE CONSOLIDATED.—The official monthly statement of the company for September shows the following:

Sept. 1.	To cash on hand		$91,605.03	
	Bullion bars, Nos. 602, 603		3,916.14	
	Pumping expense, received J. Kelly, Superintendent		174 57	
	General expense		40.80	
	Water		136.62	
	Hoisting expense		18.75	
	Mine expense		42.00	
	Reclamation of bullion		72.75	
	By various expenses			$10,466.37
	Discount on bullion bars			365.20
	Insurance, etc.			780.00
	Storehouse supplies			2,268 63
	Sundry expense			793.90
Sept. 30.	Cash on hand			81,332 56
			$96,006.66	$96,006.66

Resources.

Sept. 30.	Cash on hand	$81,332.56	
	Bullion on the way	1,826.79	
	Liabilities.		
	Drafts, sundry drafts		$943.75

CONSOLIDATED PACIFIC.—No change of importance to note, either in the working or in the character of the ledge.

MONO.—The mine has begun hoisting ore from the winze sinking below the 600 foot level, which is improving both in quality and quantity as depth is attained.

STANDARD CONSOLIDATED.—There were extracted and shipped to the mill 574 tons of ore and 750 tons of tailings; received from the ore, 792 ounces of crude bullion, and from the tailings 311 ounces, which will be shipped, with this week's run, on the 13th inst.

NEVADA COUNTY—GRASS VALLEY DISTRICT.

EMPIRE.—The 20 stamps and the four Triumph concentrators are in constant operation. The shaft is down to a depth of over 1500 feet on an incline, with pay-ore coming from five levels.

MARYLAND.—Work is prosecuted actively, the new pumping machinery being completed. The mine joins the Idaho, and the pay-chute of the latter is pitching into the Maryland ground.

PEABODY.—There are 1200 feet of drifts open, and pay-ore is taken out from three separate ledges. Thirty loads of the ore are going through the Omaha mill.

SIERRA COUNTY.

PLUMAS EUREKA.—The credit balance on the half-year's working is £18,722, and the net profit £12,758. The main Eureka chute has so narrowed that the reserves in that mine have been mostly used up, and the other ore-bodies are all of poor quality. Explorations are vigorously carried on. The total quantity of ore crushed was 27.416 tons, of which 21,081 came from the Eureka mine alone.

SIERRA BUTTES.—The balance to the credit of profit and loss for the last half-year is £7411, and the net profit is £3468. The outlay on improvements during the year was £5784. The produce of the mines was 17.949 tons, and the mills crushed 17,841 tons. The dividend to be declared at the meeting next week is 6d. a share.

CANADA.

UNITED MINING AND SMELTING COMPANY OF CANADA.—The negotiations into which the Canadian Copper and Sulphur Company have entered with the Huntington Copper and Sulphur Company have resulted in the proposal to form the United Mining and Smelting Company of Canada, with a capital of £177,250, divided into 75,000 7 per cent preference shares of £1 each, and 102,250 ordinary shares of £1 each. An extraordinary general meeting of the shareholders was held in England, October 10th, to obtain the ratification of this agreement by the shareholders. The directors state explicitly that, unless the new scheme receives substantial financial support from the shareholders, these valuable properties must be sacrificed. The compulsory sale of the company's property has been postponed until November.

The iron mines at East Templeton and in that district are doing a good business. Twenty men have been engaged to work in a mine belonging to Messrs. McLairn & Blackburn.

PROVINCE OF NEW BRUNSWICK.

NEW BRUNSWICK ANTIMONY MINING COMPANY.—It is understood that this company will assume operations in its mines in Prince William about the first of December.

PROVINCE OF ONTARIO.

PHILIPSBURG QUARRY COMPANY.—The company announces the issue of 750 shares as preference shares for the purpose of acquiring modern plant and machinery necessary for working the property. The owners will place their property in the hands of directors, to be named by subscribers to these shares, as security for their repayment (by way of bonus) of the amount thus advanced. These shares to rank as preference to the full amount of profits until a bonus of 100 per cent has been paid thereon.

PROVINCE OF QUEBEC.

LIEVRES RIVER LAND AND PHOSPHATE COMPANY.—At the annual meeting held in Montreal, October 14th, the following directors were elected: Robert C. Adams, W. R. Elmenborst, William T. Costigan, and Peter Lyall, of Montreal; Charles H. Trask, of New York; and A. F. Freeman, of Boston. At a subsequent meeting of directors, Robert C. Adams was elected President; W. R. Elmenborst, Vice-President; William T. Costigan, Treasurer; and J. Keith Reid, Secretary. This company has acquired several valuable properties in the neighborhood of the Lievres River, and has already begun active mining operations.

COLORADO.

CHAFFEE COUNTY.

CALUMET & HECLA.—At these iron mines, the property of the Colorado Coal and Iron Company, the vein has been opened up for a distance of 600 feet in length, and will average fifty feet in width for that distance, while at some points prospecting with the diamond drill has shown it to be 100 feet in width.

CLEAR CREEK COUNTY.

The Georgetown Sampling-Works are treating a large quantity of mineral. The Miners' Sampling-Works treated and shipped for the month of September 150 tons of ore; average gross value, $145 a ton, or a total gross value of $21,750. During the month of September, there were fifty cars of ore, or about 550 tons shipped from the Georgetown depot, valued at about $75,000.

HOOSAC.—The reorganization of this company is talked of.

KOHINOOR & DONALDSON.—The mill is repairing and altering, preparatory to starting up again.

LITTLE MATTIE.—It is announced that the mine is to be operated by a much larger force than heretofore.

UNADILLA.—This company, of New York, whose property is located in the vicinity of Dumont, has finally got its affairs amicably adjusted, and the development of its properties will now go forward.

GILPIN COUNTY.

CONSOLIDATED BOBTAIL.—Parties are at work at the stamp-mill of the company experimenting with a new concentrator for mill tailings. They are said to be meeting with good success.

GUNNISON COUNTY.

EUREKA-NEST EGG.—The Eureka-Nest Egg suits have all been compromised by the consolidation of the two claims, the Eureka owners taking two thirds and the Nest Egg folks one third, all suits to be dropped, and each side to pay its own expenses.

LONE ELM MINING AND SMELTING COMPANY.—This company, which operates the Moffet smelter, is now in the market for ores. The prices announced to be paid are: For ores running 20 ounces silver, $5 a ton; each additional ounce up to 100-ounce ore, $1—making 100-ounce ore $85: above 100 ounces, the ratio of increase is somewhat greater. For the lead, nothing is paid for 20 per cent or less; all over 20 per cent, 1½ cents a pound. Nor is any price paid for 2 per cent or less of copper; over 2 per cent, 6 cents a pound, dry assay. No charge made for sampling ores purchased by the company.

HINSDALE COUNTY.

ARGENTA FALLS.—The completion and successful operation of this company's sampling and concentration works is recorded.

CROOKE MINING AND SMELTING COMPANY.—The doing of custom work in the concentrator is an experiment; if it proves satisfactory, the company will continue.

LAKE COUNTY.

The Leadville *Herald* has the following:

A. Y.—Mr. Samuel Harsh has disposed of his interest in the A. Y. mine to his partners, Messrs. Graham and Guggenheim, and resigned the management. Mr. Thomas Weir will succeed him.

CHRYSOLITE.—The mill is now running regularly upon Chrysolite "dump" material; and it is believed that the problem of the profitable treatment of this material—of which the company possesses 50,000 tons, already mined—will be shown to have been solved successfully. The cash surplus of the company, stated in the last annual report at something over $197,000 on November 1st, was reduced during the next few months, by the cost of explorations, to about $165,000, but has since been increased to about $190,000 October 1st.

COLORADO & UTAH SAMPLING-MILL.—The manager has begun receiving iron ore for exportation to Salt Lake City.

LITTLE PITTSBURG.—Artemus H. Holmes has brought suit against ex-Senator Jerome B. Chaffee and Daniel H. Moffatt, in the Supreme Court, New York City, alleging that he had invested $13,888 for 650 shares of the stock of the Little Pittsburg Mining Company, in 1879, on the representation of the defendants that there was ore in the mine to the value of $5,000,000, which would pay a dividend of $100,000 per month for three years, and that these statements were false. The defendants did not appear, and Judge Lawrence, October 13th, directed the jury to render a verdict for $15,132.

PENNSYLVANIA.—A large contract has been made with the Colorado Coal and Iron Company, of Pueblo, for iron ore from this mine, on Breece Hill. The iron here is at the surface, and can be mined at a small cost.

MAID OF ERIN.—Judge Brewer, in the United States Circuit Court in Denver, has decided the suit of the Maid of Erin against the Vanderbilt lode, in favor of the Maid of Erin.

PARK COUNTY.

LONDON.—The tailings in the ponds are running through the mill a second time with good results. The tailings all assay from eight to fifteen dollars a ton, and, having been subject to repeated freezing and thawing during the past twelve months, are more decomposed and oxidized than when first milled, and yield a greater amount of free-milling gold. Moreover, improvements have been made that insure closer and more economical work. It is also stated that the amalgam secured from the tailings is nearly sufficient to pay the running expenses of the mill.

PITKIN COUNTY.

SMUGGLER.—The mine has been leased for nine months, and will start up soon.

PUEBLO COUNTY.

NEW ENGLAND & COLORADO SMELTING COMPANY.—The new stack and furnaces are completed. The company expects to start up about the first of November.

SAN JUAN COUNTY.

NATIONAL BELLE.—The sale of this mine, in the Red Mountain District, is reported. It was bonded last spring for $90,000 by J. A. Porter and J. G. Taylor, who have sold it for $125,000.

DAKOTA.

FATHER DE SMET.—Under date of October 4th, the secretary writes: Inclosed please find express company's receipt for bar No. 193, containing 1269·05 ounces of gold, the result of clean-up of the mill for final run in September, making a total of 2298·25 ounces for the month's product. The outlook of the mine has not changed any from that of last month. Eureka cut, ore-breasts are still showing considerable slate and low-grade matter; but we think we can carry it all as usual and keep the shipments up to about the present rates. We have stopped work in the face of the east cross-cut for the present, and begun breasting out south in the large ledge just cut through. The quality is very low, but justifies further prospecting. Connection was made in Golden Gate uprise this morning. The report for the week ended October 8th shows ore extracted from first, second, and third levels, 2055 tons; ore milled, 1975 tons. Golden Gate east cross-cut, second level, advanced 2 feet; total length, 120 feet. Stopped for the present. Golden Gate uprise, 3½ feet. Rise up, 53½ feet. Finished.

IDAHO.

ATLANTA.—It is expected that the mill that has been purchased of Messrs. Fraser & Chalmers, of Chicago, will be ready for operations November 1st.

IDAHOAN.—It is stated that this mine has been sold to an English syndicate for $400,000.

TAHOMA.—Preparations are making for large operations, by an Eastern company.

MEXICO.

The Mexican *Financier* gives the following description of a mining district in the State of Chihuahua, hitherto but little known: About midway between El Paso and the city of Chihuahua, on the Mexican Central Railroad, is the station of Montezuma. There is promise in the neighboring mining camp of one of the most prominent districts of Northern Mexico. This camp lies about twenty-five miles west of the station, has been worked less than two years, and is turning

out the best carbonate found in that section. Some fifty different properties are worked, and all show well. The mine known as the Dunlap has been longest worked, and is most extensively developed. Several car-loads of its ore have been shipped to Kansas City for treatment, with most profitable results. Adjoining, and forming an extension of it, is the mine of Messrs. Davis & Abell. This is developing on a vein that grows in size and richness of ore as work progresses. The other properties are located in the same valley, three or four miles distant. The formation is porphyritic, iron cappings marking the location of the veins. The camp is entirely American. None of these properties has been put on the market yet, but all are developing in a quiet way. Here is one of the best openings on the line of the Mexican Central Railroad for extensive smelting-works.

Mr. T. B. Provis, who has recently inspected the property of the North Mexican Silver Mining Company, has reported favorably on the company's mines in Chihuahua to a general meeting of the debenture-holders in London, held on the 9th of last month. The value of this property has been much enhanced since Mr. Provis's inspection, by the reduction of the tax on silver ore from 5 per cent to ½ of 1 per cent, by the railroad communication, and by other facilities for working.

The government of Zacatecas has authorized Sir Juan Brena, or the company that he may organize, to construct and operate a railroad between that capital and the mining town of Veta Grande, with the branches that may be deemed necessary to unit it with the line of Guadalupe, as well as the mines and reduction-works.

Batopilas.—Letters from General Manager Shepherd dated Batopilas, September 17th to 19th, say: We are having heavy rains now. This season is a good deal like last year. Things are looking tolerably well here, all in full blast, and I trust will stay so. From the 18th of August to the 16th of September, 109 bars of silver went out of these gates; of course, some 23 were beneficiated prior to the 18th of August. If I had water and tramways, I should have no fear of averaging over $100,000 a month from all these mines. No one mine is of any account for a business here; but all together, with power and means of getting ore, it will be a success beyond all calculations. Brodie's idea that consolidation was a kind of "mutual insurance company," was the best illustration I have heard. When one is out, another is in—the yield keeps on. I am running our low-grade San Miguel and tailings together through concentrators, and trust to wipe out a large part of San Miguel debt before November. Brodie's illness has kept the smelts from being made up, as he is the only one to do it. So I can not get accounts in as I would have liked before October 1st, when I will cover all to that date. It is impossible to send any accounts without this goes into it, as the number of pounds or tons of ore gives no idea of the value or yield. I am short-handed, and I am running the reduction-works myself; have to use my little son Aleck on one of the roasting-furnace shifts as boss. The Mexicans are no good to boss each other. My coming will depend largely on our yield. I shall try to pay up every thing before I do. I feared last week was going to be a bad week, as Camuchin and Roncesvalles went out, but others came in, notably Descumbridora, and it foots up about the same yield as usual. A good strong pull, and we will soon be out of debt.

MICHIGAN.

Detroit & Lake Superior.—The smelting-works at Ripley began operations October 6th.

GOLD MINES.

Phillips.—At this property, immediately west of the Ropes, work has begun. The shaft sunk by the Deer Lake Company will be unwatered, sunk several feet farther, a sump made for a pump, after which cross-cuts on the formation will be made. Starting from the bottom of the hill, a drift or tunnel will be run southward, cutting the formation.

IRON MINES.

Lake Angeline.—New hoisting machinery is erecting, and will be in operation soon.

Ludington.—The management has under way measures looking to a thorough change in the surface improvements.

Metropolitan.—The mine ceased shipments and all active works Saturday last.

MONTANA.

BEAVERHEAD COUNTY.

Hecla Consolidated.—The company has produced for the nine months ended September 30th, 503,037 ounces of silver; 192 ounces of gold; 283,560 pounds of copper; and 3,505,934 pounds of lead. A third furnace is in course of erection, and is nearing completion.

SILVER BOW COUNTY.

Alice.—There were 3032 tons of ore crushed last month, the largest amount since the starting up of the machinery.

Anaconda.—The copper concentrator, said to be the largest in the United States, started operations October 4th. An increased force of miners will soon be put to work on the Anaconda mine.

Bell.—At the smelter, both blast-furnaces are in operation, and about 100 tons of ore a day are treated.

Clark's Colusa.—The new concentrator for working the ore from this mine is nearly ready for use. A water-jacket furnace is to be put up by the side of the concentrator.

Montana Copper.—The work of putting up two new calciners and a new concentrator of 75 tons a day capacity has begun. On the Colusa, the shaft is down 600 feet. The Montana-Parrott mine, belonging to this company, will be in good working order in about a week. On this mine, they have been putting up a new hoist and hoisting-works, and, when completed, the work of taking ore from the 300-foot level will begin. The West Colusa is down about 180 feet.

Volunteer.—At this mine, under bond to Walker Brothers, the shaft has been sunk to a depth of 100 feet, the indications being that a few feet more of sinking will bring the vein into the shaft. At the depth of about 40 feet, a cross-cut was run to tap the vein, and at that depth it was found to be 30 feet wide, and sampled 75 ounces.

NEVADA.

ESMERALDA COUNTY.

Mount Diablo.—It is reported that the company will shortly erect a twenty-stamp mill at Sodaville, on the Carson & Colorado Railroad.

EUREKA COUNTY.

Albion vs. Richmond.—In the trial that took place in July last, and which was mentioned in the Engineering and Mining Journal of August 2d, the Richmond Company gained a great victory. The action was brought by the Albion Company for $500,000 damages for ore extracted from its ground, and a verdict was rendered for $13,250. The Albion has now made a motion for a new trial, and in support of that motion filed in the court at Eureka affidavits charging bribery of the jury against the Richmond managers. These affidavits contain charges of the most astounding character. The San Francisco *Report* says that this will probably be one of the most sensational pieces of litigation ever enjoyed by Nevadans. One of the affidavits referred to is by a juror named Matthews, who explains how and from whom he received $1000 for his vote. Of this amount, he has turned over $520 to the Albion attorneys. The balance, $480, he paid to a man to whom he was indebted. This man has also made affidavit and states that Matthews told him it was portion of a $1000 bribe paid to him as a juror in the case. A man named Haley, a friend of a juror named Bazetti, also makes affidavit of Bazetti's telling of the receipt of $1000 as a bribe, and from whom he received it. There are numerous affidavits, to the same and similar effect, compromising gentlemen who stand very high in the political and legal circles of Nevada.

LANDER COUNTY.

Pittsburg Consolidated.—The machinery for the new mill, which is to be built at Lewis, has arrived.

STOREY COUNTY—COMSTOCK LODE.

At the north end, the joint winze of the Ophir, Mexican, Sierra Nevada, and Union Consolidated is completed to a point which gives sump-room below the 3300 level, and at this level a working station is excavating, from which explorations will be made to the westward. This cutting across the Comstock lode at the great depth of 3300 feet below the surface is a work, says the Virginia *Enterprise*, that will interest all who have ever examined the vein formation and the temperature and stratification of the country-rock adjoining. Being the greatest depth attained on the American continent, if not in the whole world, this new level will naturally attract the attention of all scientific tourists passing this way.

At a meeting of the Hale & Norcross directors, the president and secretary were authorized to borrow, as the company may need, a sum of money not to exceed $50,000. The Chollar, Potosi, and Savage companies owe the Hale & Norcross $85,000 for contract work.

NEW JERSEY.

Lebanon Valley Smelting Company.—Articles of incorporation for this company have been filed at Camden by John S. Detwiler, Wilmer Knipe, and John D. Harris, of Philadelphia, and William Curtis, of Camden.

NEW MEXICO.

Governor Sheldon, in his report to the Secretary of the Interior, says that the territory has prospered materially in all its industries. The production of gold and silver has reached a point sufficient, in the opinion of the governor, to justify the establishment of a United States mint in the territory. It is further stated that seven eighths of the public land will in all probability never become the property of the citizens, as it is difficult to comply with the requirements of the present land laws, on account of the absence of water. The failure to settle the status of the Spanish and Mexican grants is said to have retarded the progress of the territory.

Johnny Bull.—The suit of Don Carlos Butterfield against William H. Henry for $100,000 alleged commission for endeavoring to negotiate the sale of the famous Johnny Bull copper lode in San Simon, belonging to Mr. Henry, ended October 13th in Part II. of the Supreme Court, New York City. The property has $2,000,000 worth of ore in sight, which consists of gold, silver, and copper. After hearing the testimony (taken by commission) of Butterfield, Baron Schultz, and Captain Price, of London, on motion of Jerome Buck, counsel for Mr. Henry, Judge Barrett dismissed the complaint. This is an important decision, as it was an attempt to collect a commission of $100,000 on an alleged sale of the property for $200,000 cash, when the vender and the vendee were never brought in contact and when no money was tendered or bond given to the broker. The property has attracted the attention of the London and New York mining exchanges for several years, and the decision has been awaited with great interest. The ground upon which Judge Barrett dismissed the suit was, that the plaintiff had failed to prove that he had provided a customer willing to pay $200,000 for the mine. It was upon this condition alone that Butterfield was to receive the $100,000 as commission. Butterfield claimed that Mr. Price, an agent in London representing a syndicate of English capitalists, had offered to him the sum of $200,000 for the property. Mr. Price, in an affidavit which was submitted, stated that he had made no such offer to the plaintiff.

Lucky.—This company has been incorporated. The property is at Cerrillos, in Santa Fé County, and development-work is to be commenced at once.

San Pedro & Canon del Agua.—The United States Court in New Mexico has just given a decision in favor of the San Pedro & Cañon del Agua Company in all the points at issue between the company, the squatters, and the United States government. It is not probable that an appeal to the United States Supreme Court will be taken. The suit has been pending several years. It is said that the company is now reorganizing upon the basis of $1,000,000 of preferred stock to cover the bonds and all indebtedness, and $1,000,000 of common stock to represent the old $10,000,000 of San Pedro stock.

UTAH.

JUAB COUNTY.

Bullion.—This mine, better known as the Beck, is working 52 men, and is shipping about 35 tons of ore a day. A depth of 250 feet has been attained. This ore averages 27 ounces of silver and 16 per cent of lead.

Crismon-Mammoth.—It is not probable that any thing will be done to change the present status of the affairs of this company. It is rumored that the English stockholders have secured an option on the greater number of the bills held at Salt Lake City against the company.

Eureka.—A depth of nearly 600 feet has been obtained. From 150 to 275 men are employed and about 75 tons of ore a day are produced, which is shipped to various points. This ore goes about 20 per cent in lead and 30 ounces in silver.

Tintic.—Recently a strike of ore was made on one of the levels, the body of ore being very large, consisting of lead-silver carbonates, with but little galena. The company is working twenty men in the mine, and, when the mill is operated, will work twenty more.

Utah Forwarding Company.—The iron mines near Silver City are operated by this company. These mines are shipping from 50 to 100 tons of ore a day to the smelters in Utah and Idaho. This ore is classed as the very best fluxing ore in the country.

SALT LAKE COUNTY.

Frisco Consolidated.—This company, at Bingham, has been attached and is generally considered insolvent, says the Salt Lake *Tribune*.

SUMMIT COUNTY.

Ontario.—The sixth level is driving through the new west ground toward the Daly shaft. It has still something more than 2000 feet to go, although the face is now 1400 feet west of shaft No. 3. The lateral drain tunnel is kept a hundred feet or so ahead of the opening on the vein. The fifth level is not far behind. The two have to be run substantially together, and connected by winzes to keep the air good. The ninth level must now be opened east and west, from shaft No. 2, 600 or 700 feet. Ore is taken from the west ground on the eighth, and from the sixth, up well toward the third. Completing the sump and station on the tenth level, shaft No. 3, still awaits the slacking off the water rising from the bottom of the shaft; but Mr. Chambers thinks they will undertake to do it anyhow, within a month or so. It is expected that the pumps will start in thirty or forty days. The men have cut through the hanging-wall of the vein about 200 feet south of the shaft, and run into it 12 feet, three feet of which were in ore that it is thought will average 100 ounces. The strike is very encouraging for the Ontario, as showing probable, almost certain, continuance of its vein from 3000 to 4000 feet west of shaft No. 3.

WASHINGTON COUNTY.

Mountain Chief.—The company started its one-stack smelter October 10th. The ore is a carbonate carrying 65 lead and 15 silver, and apparently improving in quality. The bullion will have to be hauled 85 miles to Milford. Possibly the business may justify extending the Utah Central Railroad another 75 or 100 miles. Charcoal is used for fuel.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Oct. 17.

The mining market has been devoid of all animation. The week just closed has been one of the dullest of the season, and it is feared that this depression of the market will continue until the closing of the political campaign. Even Consolidated Pacific, which for some time has been the leading and most interesting feature, was affected by the prevailing dullness, and sales amounting only to 5600 shares are reported, as against 13,500 for the preceding week; the price has been steady, the highest being 82c. and the lowest 73c. There seems to be a growing demand for Horn-Silver; the stock has been actively dealt in, the prices ranging at from $5.50@$6.38 with sales of 3839 shares. Bodie Consolidated seem to be again a favorite stock; the prices this week have ranged at from $2.15@$2.40. The report for September, which we publish in another column, shows the company's affairs to be in good condition. California and Consolidated Virginia show considerable business, with steady prices. Spring Valley, which has not been quoted recently, appears again on the list, with sales amounting to 1100 shares, and prices at from $1@$1.25. In the Leadville stocks, Aimie Consolidated and Little Chief show the largest business; the prices of the former ranging steady at from 4@5c., and the latter at from 25@30c. Sutro Tunnel records sales amounting to 3600 shares, with steady prices. The other stocks have received but little attention. The total sales this week amount to 35,229 shares, asagainst 63,055 the preceding week. The tables printed elsewhere give a complete summary of the market.

MEETINGS.

Carbonate Hill Mining Company, No. 48 New street, Room 11, New York City, annual meeting of stockholders November 6th, at one o'clock P.M.

Chrysolite Silver Mining Company, No. 13 Burling Slip, New York City, annual meeting of stockholders November 5th, at from twelve to two o'clock P.M.

Mount Pleasant Mining Company, No. 18 Wall street, Room 47, New York City, annual meeting of stockholders October 22d, at twelve o'clock M.

Ophir Gold Mining Company, No. 30 Cortlandt street, New York City, adjourned annual meeting of stockholders October 21st, at twelve o'clock M.

DIVIDENDS.

Derbec Blue Gravel Mining Company, of California, has declared a dividend (No. 6) of ten cents a share, payable October 9th.

Father de Smet Consolidated Gold Mining Company, of Dakota, has declared dividend No. 38, of seventy cents a share, payable at the office of Laidlaw & Co., No. 14 Wall street, New York, October 31st.

Homestake Gold Mining Company, of Dakota, has declared a dividend (No. 74) of $25,000, payable October 25th. Total dividends to date, $2,537,500.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report that the petroleum market this week has been a disastrous one for the bulls. The Phillips gusher in Baldridge District, Butler County, Pa., which astonished the trade by a steady daily production of about 2000 barrels, was cast into insignificance on Monday night by the opening of the Christy well, which startled the trade by a production the first day of over 5000 barrels. This so completely demoralized every body that the market, which closed Monday at 69c. opened Tuesday at 67c., and soon sold down to 61½c., recovering Thursday to 64¼c., and 64½c. to-day. The market, to-day, however, sold down just before the close to 61½c. on reports that Fisher No. 10, 1200 feet west of the Phelps gusher, was showing for a large well. The Conner well is due to-day, and there are several others in this vicinity that are expected in soon, and they are worse than a wet blanket on the market. The trade is getting very bearish, as it always does when low prices prevail, and prices may go lower, but that there will soon be a sharp turn upward is probable. The visible supply of oil has decreased 300,000 barrels so far this month.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
Oct.	11	$0.73½	$0.74	$0.69⅝	$0.70¼	8,357,000
	13	.69½	.69½	.67¼	.69	10,630,000
	14	.67	.67	.61½	.62⅝	9,598,000
	15	.62	.63	.61½	.62⅛	5,631,000
	16	.62	.64¼	.62	.63⅞	4,894,000
	17	.64	.64½	.61⅛	.62	4,993,000
Total sales						44,103,000

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

Name of Company.	Closing Quotations. Oct. 10.	Oct. 11.	Oct. 13.	Oct. 14.	Oct. 15.	Oct. 16.
Albion						
Alpha						
Alta	1.75	1.75	1.75	1 87½	1.87½	1.75
Argenta						
Bechtel						
Belcher		.80	.85			.85
Belle Isle						
Best & Belcher	1.75	1.75	1.75	1.75	1.75	1.75
Bodie	2.12½	2.12½	2 25	2.12½	2.00	2.25
Bullion						
Bulwer						
California	.40	.40	.40		.35	
Chollar	2.00	2.00	2.00	2.12½	2.25	2.00
Con. Pacific	.80	.80	.80	.80	.85	.85
Con. Virginia		.20	.20	.20	.15	
Crown Point	1.37½	1.37½	1.37½	1.37½	1.50	1.37½
Day						
Elko Cons						
Eureka Cons		3.12½		3.25		
Exchequer						
Gould & Curry	1.12½	1.12½	1.25	1.12½	1.25	1.12½
Grand Prize						
Hale & Norcross	2.50	2.50	2.62½	2.75	2.87½	2.75
Independence						
Martin White		.40				
Mexican	1.25	1.25	1.12½	1.25	1.25	1.00
Mono						
Mount Diablo	3.25					3.37½
Navajo	3.62½	3.62½		3.62½	3.75	3.87½
Northern Belle						
North Belle Isle						
Ophir	.90	.80	.75	.85	.80	.80
Overman						
Potosi	1.00	1.00	1.12½	1.12½	1.12½	1.00
Savage	1.25	1.25	1.25	1.25	1.37½	1.25
Scorpion						
Sierra Nevada	1.25	1.12½	1 00	1.00	1.12½	1.00
Silver King						
Tip-Top						
Union Cons	1.00	1.00	1.00	1.00	1.00	.95
Utah	1.00	.95		.80	.85	
Wales Cons						
Yellow Jacket	1.75	1.62½	1.75	1.75	1 87½	1.87½

The following were the financial balances of the various mining companies on October 1st:

CASH ON HAND.

Alta	$29,738 26	Hale & Norcross	$7,995.54
Argenta	104 34	Mexican	23,598.22
Alpha Con	11,239.89	Mono	24,832.26
Bulwer	4,413.80	Martin White	5,759.50
Best & Belcher	26,656.04	Navajo	69.378.45
Benton Con	21,218.29	Ophir	19,420.80
Bodie Con	81.332.56	Occidental	3,201.38
*Belcher	16,293.15	Potosi	44.011.20
Crown Point	24.649.24	Savage	2,803.82
Chollar	29,364.17	Sierra Nevada	34,583.22
California	19,380.55	Tioga Con.	921.83
†Con. Virginia	14,156.54	Union Con	32,596.28
Exchequer	8,126.14	Utah	7,900.41
Gould & Curry	25,185.45		

INDEBTEDNESS.

Grand Prize (overdraft)	$37,731.66
Lady Washington Con	3,371.56
Standard	8,722.87

* Due Sutro Tunnel Company, $10.920.
† Expenses at mine for current month, amount unknown. Day overdraft, $10.26; bills payable, $146,142.21; G. W. Grayson, $6239.11.

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Oct. 16.

The transactions in copper stocks the past week have been almost wholly confined to dealings in Calumet & Hecla, which seems to be offered for sale more freely than heretofore, and we notice that larger lots are offered and pressed for sale at every decline, showing that some of the large holders are trying to unload a portion of their stock. So far, it has found buyers at the concessions; but we look for much lower prices for the stock. The stock opened at one dollar off from the closing of last week, with sales at $144; quickly dropped to $140 on sale of about 200 shares; and declined still further on a 50-share lot to $139, closing to-day at $135 bid, $138½ asked, and no sales. Advices from the mine in regard to the fire show that the first reports were greatly exaggerated, and that the new workings at the South Hecla will supply the stamp-mills with all the rock necessary during the stoppage of work underground. Quincy continues firm at $28, with small sales at that price, which is bid, and none offered to-day at less than $32. A sale of a small lot of Osceola is reported at $8⅝, which is a fraction lower than last week. There is nothing doing in the other mines on the list, and no prospect of activity in the speculative mines.

The market for silver stocks has dwindled down to almost nothing. San Pedro was galvanized into life on the recent decision favorable to the company in regard to the title of the property, and some sales are reported at 10@12½c. This stock sold at one time as high as $6½@$7 a share. Bowman Silver, dealt in at the Mining Exchange, has been the most active stock, and has ruled fairly steady at 5@6c. Dunkin, dull at 20c. bid. Consolidated Pacific declined from $1.05@70c., with later sales at 82@85c.

3 P.M.—The market this afternoon was treated to another surprise party on Calumet & Hecla; the announcement being made that the company would pass its next quarterly dividend in November. The stock was pressed for sale, and offered down to $130 before finding a purchaser, and still further concessions had to be made to effect sales, selling down to $127, and closing weak at $123 bid. This makes the dividends for the past year $8 a share only, and will no doubt bring out the stock freely, and result in a decline in price to the vicinity of $100 a share, which would be all it is worth as an 8 per cent investment. There is no change to note in the rest of the list.

BULLION MARKET.

NEW YORK, Friday Evening, Oct. 17.

The London market is lower and weak, and our sterling exchange rate nominal, thus affecting silver, as shown by the figures of accompanying table.

Date	London. Pence.	N. Y. Cents.	Date.	London. Pence.	N. Y. Cents.
Oct. 11	50 13-16	110⅜	Oct. 15	50 13-16	110⅜
13	50¾	110⅝	16	50¾	110¼
14	50¾	110⅜	17	*	†

*50⅝@50¾. †110@110¼.

BULLION PRODUCTION FOR 1884.

Mines.	States.	Month of September.	Year from Jan. 1st, 1884.
		$	$
*Alice, G. S.	Mont.	†	835,153
*Belmont	Mont.	17,261	33,122
*Black Bear G	Cal.		19,600
Bodie, G.	Cal.		400.627
*Bonanza King, G.	Cal.		191,891
*Boston & Montana, G.	Mont.	33,601	343.400
*Caledonia G.	Dak.		73,511
*Chrysolite, S. L.	Colo.	8,329	117,637
*Consolidated Bobtail, G	Colo.		69.199
*Contention, S. G.	Ariz.		293.607
*Deadwood-Terra, G.	Dak.	38.758	386.686
*Derbec Blue Gravel, G. S.	Colo.	17,908	124.189
*Father de Smet, G.	Dak.	38,205	348,152
Grand Prize, S.	Nev.		43.000
*Head Center Cons	Ariz.	1,273	1,273
*Head Center & Tranquillity	Ariz.	11,893	11,893
*Hecla Cons., G. S. L. C.	Mont.	‡	320,052
*Helena, G. S. L. C.	Mont.	102,000	834.036
*Homestake, G.	Dak.	116,853	952.559
*Hope, S.	Mont.		58,646
Horn-Silver, S. L.	Utah.		1,639,087
*Iron Silver, S. L.	Colo.		514,692
*Kentuck, G. S.	Nev.	729	21.944
*Lexington, G. S.	Mont.	91,389	903.499
*Mammoth Bar, G.		925	1.607
*Moulton, G. S.	Mont.		516,161
*Mount Diablo, S.	Nev.		24,820
*Murchie, G. S.	Cal.		19,000
*Navajo, G. S.	Nev.	50,846	310.831
*North Belle Isle, S.	Nev.		5,874
*Ontario, S. L.	Utah.	209,151	1,648,707
*Original, S. C.	Mont.		29,724
*Oxford, G.	N. S.	3,312	30,691
*Paradise Valley, S. G.	Cal.		103,950
*Plymouth Consolidated, G.	Cal.	78,090	780.506
*Rooks, G.	Vt.		35,256
*South Yuba, G.	Cal.		21,432
*Stormont, S. L.	Utah.		108,892
*Syndicate, G. S.	Cal.		90,475
*Tombstone, S. L.	Ariz.		379,756
United Gregory, G.	Colo.		7,174
Total amount of shipments to date			$12,643,312

* Official. † Assay value. ‡ Not including value of lead and copper; G. Gold: S. Silver; L. Lead; C. Copper. —— No bullion produced. Silver valued by the different companies from $1.05@$1.29 per ounce; gold, $20.67.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 3 per cent. During the week, the bank lost £485,000 bullion; but the proportion of its reserve to its liabilities was raised from 32⅛ to 35¼, against 43¾ per cent at this date last year. The weekly statement of the Bank of France shows a loss of 1,675,000 francs gold and a loss of 287,500 francs silver.

The Director of the Mint has prepared a statement in regard to the present money circulation in thirty-nine of the principal countries of the world, as compared with the circulation as reported a year ago,

which shows a decrease in the gold circulation of about $52,000,000, an increase in the silver circulation of $42,000,000, and an increase in paper circulation of $112,000,000. He attributes the loss in gold circulation to a reduced production and to the increased use of that metal in ornamentation and the arts.

The Treasury Department has purchased 445,000 ounces of silver for delivery at the New Orleans and Philadelphia mints.

METALS.

NEW YORK, Friday Evening, Oct. 17.

Copper.—The market has been dull and quiet, Lake being procurable at 13c., while other brands are worth 12@12½c., according to quality. The Calumet & Hecla fire is still smoldering, and may lead to a longer stoppage than was anticipated.

Chili Bars are cabled £53 15s., and Best Selected £59, from London.

Messrs. James & Shakspeare have published the following statistics for September :

		Imports. Tons.	Deliveries. Tons.	
	—Sept 1 to 30.—			
Fine foreign, chiefly Australian		448	833	London.
Chili	Bars	1,516	1,751	
	Ingots	167	247	
	In ores and regulus	1,053	1,083	Liverpool and Swansea.
American, chiefly furnace material		3,028	2,925	
Spanish precipitate and sundries		2,195	2,408	
Totals—England		8,407	9,247	
American, chiefly ingots		525	60	
Chili bars, ingots, and Barilla		2,284	2,278	France.
Sundries		35	35	
Totals — England and France		11,251	12,160	
	—Stocks.—	Sept. 30.	Aug. 31.	
Fine foreign, chiefly Australian		3,078	3,463	London.
Chili	Bars	21,768	22,003	
	Ingots	20	100	
	In ores and regulus	728	758	Liverpool and Swansea.
American, chiefly furnace material		359	256	
Spanish precipitate and sundries		4,416	4,629	
Totals—England		30,369	31,209	
American, chiefly ingots		275	350	
Chili bars, ingots, and Barilla		1,019	1,013	France.
Sundries		Nil.	Nil.	
Totals — England and France		31,663	32,572	
Advised by mail and telegram :		Tons.	Tons.	
Chili		7,900	9,190	
Australian		1,200	775	
Total visible supply		40,763	42,537	

		Jan. 1 to Sept. 30.		
		Tons. 1884.	Tons. 1883.	Tons. 1882.
Total	Imports	74,881	71,409	58,458
	Deliveries	83,061	68,103	62,606
		12 months ended Sept. 30.		
		Tons. 1884.	Tons. 1883.	Tons. 1882.
Total	Imports	99,841	90,828	77,229
	Deliveries	106,611	86,990	86,929

Messrs. James Lewis & Son, of Liverpool, report : The arrivals here from the United States consist of 327 tons bars, 105 ingots, 587 matte, and 6750 ore, equal to about 3028 tons fine copper.

The sales of furnace material have been :

Tons.			Per cent.		Per unit.	
100	Ore	Betts Cove	8	at Liv.	9s 6d	
200	"	Norwegian	20	at Swa.	10s	1½d
139	Prec	Mason's	Wh.	at Liv.	10s	3d
150	"	"	"	"	10s	0d
196	"	"	"	"	10s	3d
75	"	English			10s	9d
105	"	"			10s	9d
130	"	Mason's	Wh.	at Liv.	10s	0d
50	"	Rio Tinto (B. S.)			11s	3d
150	"	" (No. 2)			10s	1½d
723	Ore	Betts Cove	8	at Swa.	9s	4½d
405	Reg	"	12	"	9s	4½d
150	"	Italian		"	10s	3d
50	Prec	English			10s	9d
25	"	Rio Tinto (B. S.)			11s	3d
500	"	"	"		11s	0d
500	Ore	Betts Cove	8	at Liv.	9s	4½d
500	Reg	Bolivian		at Swa.	10s	6d
100	Ore	Betts Cove	8	at Liv.	9s	4½d
60	Prec	Rio Tinto (B. S.)		"	11s	3d
200	Ore	Mexican	25	"	10s	6d
175	Prec	Rio Tinto (2d qual.)			10s	1½d
100	"	" "		at Liv.	10s	1½d
50	"	" "			10s	1½d
500	Reg	Chili	45	to arr. at Sw.	10s	7½d
318	Ore	New Quebrada (Yel)	10	at Liv.	9s	6d
500	"	" "	10	"	9s	6d
400	"	" (Ruby)	12	"	9s	9d
32	Prec	Rio Tinto (2d qual)		"	10s	1½d
100	Reg	Chili	45	to arr. at Liv.	10s	7½d
50	Prec	English			10s	9d
355	Ore	Libeola	7		9s	7½d

Messrs. James Lewis & Son report : Imports of other than Chili copper, in tons fine, into Liverpool and Swansea during the first nine months of the following years :

	1882.	1883.	1884.
From United States	5,1	6,006	12,752
Canada	244	353	266
Mexico	202	460	254
Peru	741	374	323
River Plate	196	302	105
New Quebrada	2,448	3,162	2,753
Newfoundland	995	1,066	224
Spain	327	1,435	2,344
Portugal	....	110	230
Italy	1,072	691	553
Norway	304	178	235
Cape of Good Hope	3,024	3,939	4,177
Australia	112	160	419
Sundries	565	820	236
Precipitate	6,478	8,531	7,601
	17,829	27,588	32,472

Tin.—Owing to the closing out of holdings by a speculator in London, weakened, it is said, by losses in copper, the London market dropped to £72 15s. on Wednesday, and in sympathy with this our market came down to 16⅝c. for spot, and 16¼c. for futures. It has rallied in London to £74 12s. 6d., and has advanced here to 17⅝@17¾c. for spot Straits. From 300 to 400 tons have changed hands during the week.

Lead.—In the aggregate, about 600 tons of lead have changed hands during the week, some of it being taken to hold up the market, and now 3·72½c. is bid by a seller to consumers. The market is quiet and dull here.

From St. Louis, Messrs. John Wahl & Co. telegraph to us as follows to-day :

In sympathy with other markets, an increasing dullness has characterized our lead market. Since our last report, prices have further declined and sales have been made as low as 3·50c. for Refined lead and 3·47½c. for Common lead. Sales foot up to 750 tons of Refined lead at 3·50c.; 200 tons of Chemical lead at 3·47½c. Common lead could not be placed at over 3·45c.

From Chicago, Messrs. Everett & Post telegraph to us to-day :

Business has been quiet and of a limited character, with quotations at 3·55c. The demand is only moderate, and there is little doing. Offerings are very light, the stocks in the hands of holders being limited. Consumers are poorly supplied, but, until the settlement of the political question, will not anticipate their wants.

Spelter.—This metal is dull at 4·45c. for Common Domestic.

Antimony.—There has been no change.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Oct. 17.

American Pig.—The market remains very much in the same position, with some slight indications of weakness.

We quote standard brands : No. 1 Foundry, $19.50 @$21 ; No. 2, $18@$19 ; and Gray Forge, $17@$18, with outside brands from $1@$1.50 lower. Foreign Bessemer is nominally $18.50@$19. Spiegeleisen is dull at $26.50, and is freely offered at that figure for 20 per cent.

Scotch Pig.—The market remains stagnant.

We quote ex ship and to arrive : Langloan, $21.50 ; Summerlee, $20.75 ; Dalmellington, $20; Gartsherrie, $21 ; Eglinton, $19.25@$19.50 ; and Glengarnock, $20@$20.50.

At the Metal Exchange, the following cable quotations have been received : Coltness, 59s. 6d. ; Langloan, 58s. 7d.; Summerlee, 53s. 9d.; Gartsherrie, 55s. 6d.; Glengarnock, at Ardrossan, 50s.; Dalmellington, 47s.; and Eglinton, 44s. Warrants, 41s. 10d.

Steel Rails.—The event of the week has been a transaction that is well calculated to show how different is the position of this industry as compared with what it was only a short time ago. The Lackawanna Iron and Coal Company, of Scranton, Pa., has just concluded a contract with the Canada Pacific Railroad for the delivery at Brockville, Canada, of 9200 tons of rails, at about $28.50, the question of freights from Scranton to Brockville not having been yet quite settled. The contract was carried off in direct competition with English works, rails being held in English shipping ports at about £4 15s. It is not claimed, of course, that the contract is a lucrative one, but it is possible that it will be filled without a serious loss. The Lackawanna Iron and Coal Company has the advantage of having cheap coal, its furnace fuel not costing it much more than $1 a ton, while for reheating, etc., it burns coke, the cost of which is very low. The company owns its own iron mines, and makes the bulk of the spiegel it uses, and is therefore in many respects in an exceptional position. We understand that, contrary to the rumors afloat, the rails will be made from American iron, the expense and trouble of using foreign pig, and afterward claiming a drawback, being greater than the saving thus effected. The move is certainly one of which the managers of the Lackawanna Iron and Coal Company may justly be proud. We quote $27 at mill.

Old Rails.—There have been some sales at $16.50 @$17.50.

Philadelphia. Oct. 17.

[From our Special Correspondent.]

Pig-Iron.—A decidedly more hopeful feeling is expressed among iron men here, and all look for a steady improvement in business and prices ; but as yet no actual improvement can be reported. The pig-iron market is dull and quiet, purchases are for pressing requirements only, and prices on all except the most desirable brands are weak and uncertain. Consumption is said to be up to the average of the past few weeks, but sales are in very small lots, as a general thing, though a few large sales of best makes were reported early in the week. The most activity has been in good brands of No. 1 Foundry, which have sold at $20@$21 delivered. No. 1 of fair make is to be had at $19@$19.50, however. No. 2 is dull and unchanged. There is very little inquiry for mill irons, and prices for some makes have weakened further. Standard brands are to-day quoted at $16.50@$17 with special makes a little higher. Ordinary Forge has sold under $16. Mill-owners are in no case anticipating requirements for any length of time, and ask for heavy concessions on any thing like a good-sized order.

Foreign Irons.—There has been a good deal of inquiry for Spiegeleisen this week, but no offers have been made that brokers could entertain. Quotations are given at $26.50@$26.75 for 20 per cent. One or two small lots have been bought ; 30 per cent is offered at $31.50@$32. Steel Blooms are offered at $37@$38 ; no sales reported.

Muck-Bars.—Quotations are nominally $30@$31, but sales have been made at a good deal less.

Merchant Bar.—The demand for refined iron is steady, but confined to very small lots for immediate use, and the manufacturers are consequently very blue over the short supplies of orders on their books. There is no change in prices, and Refined Bars are quoted at 1·80@1·90c. from mill. Common iron ranges all the way from 1·60@1·80c. The production is increasing slightly in some of the mills, owing to the advance in the season rather than to any increase in demand. No lower prices are apprehended. Better demand is considered as certain after a few weeks, and manufacturers are generally hopeful, though just at present the manufactured iron trade is in a rather discouraging condition.

Plate and Tank-Iron.—There is more inquiry and a prospect of large business, but nothing outside of the ordinary run of business is placed at 2·10c. for Common Plate ; 2·15c. for Tank ; 2·75c. for Shell ; 3·75c for Flange ; and 4·25c. for Fire-Box.

Structural Iron.—The mills are doing their usual amount of work, and most of them have still a fair supply of orders on hand. Meanwhile, there is a fair demand for ordinary lots at the usual quotations, 2·10c. for Angles ; 2·35c. for Bridge Plates ; 2·60@2·75c. for Tees; 3·40@3·50c. for Beams and Channels.

Nails.—Prices are quoted at $2.10@$2.15, but less than this inside figure has been taken for some large lots. Demand is irregular, but the consumption is fair. Prices are weak, and will probably decline further.

Steel Rails.—There is no further advance in steel rail prices, and the price for ordinary lots is generally stated to be $29, but less would be taken for heavy orders. There is active inquiry, and probability of considerable business during the remainder of the month, but no large orders have been placed. Some companies are holding firmly to the highest figures yet named, but this is easy to do in the absence of much demand. The business to be placed will probably be placed at $27.50@$28.50.

Old Rails.—The market for old rails is dull, owing to the firmness of sellers and the general indifference of buyers, who offer $17@$17.50 for rails that are offered at $18@$18.50. Bull-Heads are offered at $18.50@$19.

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

Name and Location of Company.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Oct. 11.		Oct. 13.		Oct. 14.		Oct. 15.		Oct. 16.		Oct. 17.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amie Con., Co.	.....	.....	.05	.04	.....	..	.05	.04	.....	.....	.....	.....	3,300
Argenta	..	.....	.....	.....	.. ..	.....	.....	.....	.....	.....	.....	.....	.....
Bassick, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belle Isle, Ne.	.50	.....	.. ..	.....	..	.....	.54	....	.54	.....	.....	.....	1,100
Bodie Cons., Ca.	2.30	2.25	2.15	.....	.. ..	.....	2.40	..	.....	.....	.....	.. ..	400
Breece, Co.	.20	.. .	..	.....	.....	.....	.....	.....	.....	.....	.15	.....	2,500
Bulwer, Ca.	..	.....	.....	.....	.....	.....	.61	..	.....	.....	.....	.....	400
California, Ne.	.45	.42	....	.....	.....	.....	.33	.....	.36	.....	.....	.....	1,400
Cal. & Hecla, Mich.	.....	.....	.. .	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Castle Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chollar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Va., Ne.	.24	.....	.....	.....	20	....	.21	.20	.....	.....	.....	.....	2,800
Copper Queen	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Co.	.....	.....	.....	.....	.....	.....	.20	....	.....	.....	.....	.....	400
Eureka Cons., Ne.	3.50	3.45	3.50	.....	.....	.....	3.50	.....	.....	.....	3.40	.....	850
Father de Smet, Dk.	... ..	...	3.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Findley, Ga.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gould & Curry, Ne.	1.35	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Grand Prize, Ne.	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Green Mountain, Ca.	1.75	..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Hale & Norcross, Ne.	2.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Hall-Anderson, N. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake, Dk.	.....	.....	.....	.....	.....	.....	10.00	....	.....	.....	.....	.....	100
Horn-Silver, Ut.	6.38	6.00	6.25	6.00	6.25	.. .	6.25	6.00	6.13	6.00	5.88	5.50	3,839
Independence, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iron Silver, Co.	.....	....	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Leadville C., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Chief, Co.	.....	.....	.....	.....	.....	.....	.25	....	.30	.....	.3	.....	1,100
Little Pittsburg, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Ne.	3.80	.....	.....	.....	.....	.....	3.50	.....	.....	.....	3.90	.....	300
Northern Belle.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.35	.....	.....	.....	.....	.....	300
Ontario, Ut.	.....	.....	.....	.....	.....	.....	21.00	.....	.....	.....	.....	.....	100
Ophir, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicksilver Pref., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson Cons., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savage, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sierra Nevada, Ne.	1.40	.....	1.25	.....	.....	.....	.....	.....	1.15	.....	1.15	.....	400
Silver King, Ar.	4.00	.....	4.00	.....	4.00	.....	4.00	..	.....	.....	.....	.....	300
Spring Valley, Ca.	1.00	.....	1.15	....	.....	.....	.....	.....	.....	.....	1.25	.....	1,100
Standard, Ca.	1.40	.....	1.50	.....	.....	.....	.....	.....	1.40	.....	1.40	....	600
Stormont, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tip Top, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Virina, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow Jacket	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

Name and Location of Company.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Oct. 11.		Oct. 13.		Oct. 14.		Oct. 15.		Oct. 16.		Oct. 17.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion	.....	.. ...	.15	.....	... ..	.....	.12	....	.....	.....	.....	.....	450
American Flag	.....	.....	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Barcelona, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bechtel Con., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belvidere	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'icher, G. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Big Pittsburg, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bradshaw, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, S.L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., B. H., G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Central Ariz'na, S.	.....	.....	.20	.....	.....	.....	.....	.....	.20	.....	.....	.....	400
Climax, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado Central.	.....	.....	..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Imperial	.75	.73	79	.77	.80	.....	.82	.81	.80	... ..	.80	.75	5,600
Con. Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Durango, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eastern Oregon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co.	...	...	.....	.....	.05	.....	.....	.....	.....	.....	.....	.....	100
Hortense, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lacrosse, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mariposa Pref., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Standard, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pri'nt'l & Miller, S.	.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
Rappahannock, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.09	.08	700
Red Elephant, S.	.. ..	..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ruby, of Arizona.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sonora Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bodie, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pacific.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line, 1 & 4, S.	.....	.....	.. ...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 2 & 3, S.	...	..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tunnel	.17	.....	.....	.....	.....	.....	.....	.....	.16	.15	.16	....	.16	....	3,600
Taylor Plumas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unadilla, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union Cons., G. S.	1.25	.....	.....	.....	.....	.....	.....	.....	1.15	1.10	.....	.....	.80	...	600
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
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.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Tables giving dividends and assessments will be printed the first week of each month. Dividend shares sold, 22,879 Non-dividend shares sold, 12,350.

Scrap-Iron—Has weakened somewhat. Best Selected, No. 1, or what was to be reported best, has sold at $19.50. Sales of Ordinary are reported at $1 less. Machinery is offered at $14.50.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Oct. 17.

Anthracite.

The companies have decided to suspend mining operations during the week beginning November 2d, and two weeks in December have been agreed upon, although it is not yet definitely decided whether they will be the first and third or the last two weeks in the month. It is a notorious fact that the stoppage was arranged for only after a good deal of pressure had been brought to bear on two of the companies.

Stove coal and, to a less degree, egg coal are firmer, and there has been greater activity; but the other sizes are in more than ample supply. Only about six weeks still remain of what should be the most active period of the year, and then the usual December drop incident to the restriction of the markets by the closing of navigation sets in. Meanwhile, we may expect to see domestic sizes moving off fairly well, while manufacturing sizes will probably continue to suffer from the results of general depression in all manufacturing industries and the sharp competition of cheap bituminous coal.

Mr. John H. Jones, official accountant, has published the following statement of the anthracite coal tonnage for the month of September, 1884, compared with the same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines:

	Sept. 1884.	Sept. 1883.	Difference.	
Phila. & Reading RR.	982,447	1,171,187	D.	188,740
Lehigh Valley RR.	†498,140	606.140	D.	108.000
Del., Lack. & West. RR.	432,686	472,93	D.	40,247
Del. & Hud. Canal Co.	‡303,825	359,160	D.	55,335
Pennsylvania RR	295,095	273,776	I.	21,320
Pennsylvania Coal Co.	121,735	154,129	D.	32,395
N. York, L. E. & W. RR.	43,962	47,030	D.	3,069
Total	2,677,890	3,084,355	D.	406,465

	For Year 1884.	For Year 1883.	Difference.	
Phila. & Reading RR.	7,975,657	*8,906,275	D.	930,618
Lehigh Valley RR.	4,241,349	4,568,221	D.	326,873
Del., Lack. & West. RR	3,716,033	3,675,135	I.	40,898
Del. & Hud. Canal Co.	2,426,911	2,530,865	D.	103,953
Pennsylvania RR.	2,354,268	1,989,887	I.	364,381
Pennsylvania Coal Co.	996,494	1,096,595	D.	100,100
N. York, L. E. & W. RR.	281,654	268,542	I.	13,112
Total	21,992,367	23,035,520	D.	1,043,153

* This amount includes 1,745,398 19 tons carried by the Central Railroad of New Jersey during the first five months of 1883.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 7013 tons.

‡ In addition, there were 57,310 tons transported from mines by the Delaware & Hudson Canal Company, during September, which is included in the tonnage of other interests.

The stock of coal on hand at tide-water shipping points, September 30th, 1884, was 885,591 tons; on August 31st, 1884, 885,715 tons; decrease, 124 tons.

The following are the percentages of the different companies:

	September.		Nine months.	
	1884.	1883.	1884.	1883.
Phila. & Reading RR.	36·687	37·972	36·266	38·663
Lehigh Valley RR.	18·602	19·652	19·285	19·831
Del., Lack. & West. RR.	16·158	15·333	16·897	15·954
Del. & Hud. Canal Co.	11·346	11·645	11·035	10·987
Pennsylvania RR	11·019	8·876	10·705	8·639
Pennsylvania Coal Co.	4·546	4·997	4·532	4·760
N. York, L.E. & W. RR.	1·642	1·525	1·281	1·166

Bituminous.

The market continues weak. It is not believed that the strained relations between the Baltimore & Ohio Railroad and the Pennsylvania Railroad will in any way affect this thoroughly demoralized trade.

Philadelphia, Oct. 17.

[From our Special Correspondent.]

Stocks at Port Richmond to-day are 91,000 tons, and a slow accumulation is going on. There are plenty of vessels to be had, and freights are unchanged. The *Record* is still firing heavy shot at the retail trade; yesterday's sales at that office were a trifle over 600 tons. Cold weather is stimulating demand at that office, as well as at others. The movements of this paper are attracting more and more attention. At first, it was regarded as a matter of but little importance; but people are talking seriously of a decline, and a newspaper discussion is in progress as to the yards generally selling coal at $5.75. Figuring shows this to be very close to absolute cost to retailers, counting at $3 at mines, $1.80 freight, and 75c. for handling, making the cost to retailers $5.55 at yards. Coal men say that, if the *Record* continues its present course, a good many small retailers must go out of the business. The local trade is likely to assume very large dimensions, as cold weather is in sight, and bins and yards are very poorly supplied with stocks. A better feeling prevails in manufacturing circles within the past day or two, and coal men are now in negotiation for considerable stocks, in both the local and line trades, for manufacturing requirements. No fresh advices have been received from New England, but there is a general impression that demand from that quarter will be fully up to expectations. The suspension that has been ordered for the first week in November, and the first and last weeks in December, is a natural result of the backwardness of buyers in all markets. The Reading Company was the last to consent to the suspension, being able to market its full production. The Lackawanna people are also in good shape, and were not anxious for the suspension, but agreed to it for the sake of preserving harmony. The Lehigh Coal Company has leased the Wyoming colliery, which is the most valuable in the Wyoming region, having a capacity of 400,000 tons a year. The Lehigh Valley people will secure this additional tonnage, and the Delaware, Lackawanna & Western will lose it. J. B. Altemus, director of the Lehigh Valley, will not return to that board, but his place will be taken by Joseph Wharton, of the Camden Nickel-Works.

The officers and directors of the Pennsylvania Railroad Company started on their annual tour of inspection, and will pass over 3522 miles of track during their trip.

Very little new business is to be reported in bituminous coal, but a great deal of coal is delivered on old orders. The tonnage for this year is larger than ever before, but prices are ruinously low, coal having sold f. o. b. here, as low as $2.65, and even $2.50@ $2.60 has been mentioned. The production of the Clearfield region for the week just reported is 69,737 tons, an increase of 11,716 tons, as compared with the corresponding week last year. The production for the year, to same date, is reported at 2,442,638 tons, an increase of 239,551 tons over the same time last year. The Cumberland output for the week just reported, was 47,200 tons, as against 35,757 tons for

the same week last year, and the total output for the year to date, 1,441,802 tons, as against 1,300,872 tons for the same time last year, showing an increase of 140,930 tons.

The tonnage of the Reading Company for September was 982,447 tons, showing a decline of 188,739 tons, as compared with September, 1883, and all the companies show a decline for the same month amounting to 406,464 tons. The one exception is the Pennsylvania Company, which shows an increase of 21,319 tons for that month. The total decrease in production for the year is 1,043,152 tons, as compared with the same time last year. The decrease in the output of the Reading Company is 930,618 tons, or a little over one week's production of the entire region, which, considering the suspensions this year, is not a bad showing for that company.

Buffalo. Oct. 16.

[From our Special Correspondent.]

Anthracite coal is without any features of interest; there is some "grim shadow" in the situation, however, but the reasons for the said shadow are kept so close that time only will develop them. Apparently every thing is lovely, prices unchanged, and demands steady for small lots for home and near-by places.

Bituminous coal is quiet in the absence of an active manufacturing demand for the various articles produced at this point. The number of artisans out of work is quite large, and we are entering the winter months with gloomy forebodings of hard times and suffering. Prices continue low, especially for Pittsburg.

Coke is steady, with only a moderate trade.

Shippers do not see why lake freights on coal should be advanced to Lake Michigan ports in face of the fact of the present overloaded condition of the docks at Chicago, Milwaukee, and Duluth. A leading shipper is reported as saying in effect: "I lately asked a Chicago consignee if he would take any more coal if he could get it without paying any freight, and he replied that he could not. The fact is, the farmers are not selling their grain, and the weather is not cold enough to drive them after coal. Three or four fairly cold nights would establish a good market; but with this weather and a surplus of 70,000 tons at Chicago alone, there is no great prospect of an advance in freights. I do not believe they will go above $1 this season."

Coal freights by lake closed last week very dull; a large number of available carriers then and since left light in preference to accepting 60c. freight to Chicago and Milwaukee. There has been no great pressure by shippers; coal is accumulating, and before long it must be moved. On Monday, an advance of 10c. was obtained for a few loads to Chicago, and yesterday 10c. to Milwaukee on two loads. The engagements for the week were at the following rates: 60@70c. to Chicago; 15c. to Sandusky; 40c. to Cheboygan; 45c. to Alpena; 30c. and contract to Superior City; on contract and owner's account to Duluth; 70c. to Milwaukee and Green Bay; 80c. to Racine; 20c. to Toledo; 60c. to Marquette; 30c. to Saginaw; and 60c. to Sault Ste. Marie. Closing this morning easy, with considerable inquiry for vessels for all important lake ports.

The shipments by lake from October 9th to 15th, both days inclusive, were 39,670 tons; namely, 21,000 to Chicago, 5400 to Duluth, 1430 to Toledo, 1300 to Racine, 650 to Marquette, 380 to Walkerville, 280 to Saginaw, 2340 to Sandusky, 600 to Sault Ste. Marie, 3150 to Superior City, and 820 to Cheboygan, 2400 to Milwaukee.

Receipts by lake for the week, none.

Receipts by Lake Shore & Michigan Southern Railroad for the week, 708 tons; 456 tons for Buffalo, and 252 tons for other points.

Receipts by canal for the week, 8893 tons; shipments for same period, 669 tons.

Coal charters by canal for the past week include 2 boat-loads of coal-dust to Syracuse, 65c. gross ton, captain to pay unloading, and 1 boat-load coal to Port Jackson, $1.10 net ton, captain to pay loading and unloading. The nominal asking rate to New York $1.40, and to Albany $1.20 per net ton, captain to pay for unloading.

The trouble continues. It is reported that a plan for the settlement of coal rates of freight between the New York, Lake Erie & Western, the Rochester & Pittsburg, the Lake Shore & Michigan Southern, and the Buffalo, New York & Philadelphia railroads has been practically agreed upon by all but the first-named road, which declines to enter into any arrangement that does not guarantee a certain tonnage.

Many of your readers know of the difficulties attending the navigation of the Lime-Kilns Crossing in the Detroit River, and that, through the recommendation of the Buffalo Board of Trade several years since, appropriations have been made by the general government to insure a passage for boats drawing from 18 to 20 feet of water. Work has progressed year after year slowly but satisfactorily. The present condition of the works gives a narrow channel of 16 feet, which will be supplemented by enlarged facilities very soon. Dunbar's drill is working night and day on the late $200,000 contract. The contract is to be completed in the fall of 1886, and includes a cut (in the solid rock bottom) 1700 feet long on the west side of the present channel and 2500 feet long on the east side. There will then be a straight course with a uniform width of 300 feet, and 400 feet at each end.

It would seem that in the near future we shall hear more of Fort William and less of Port Arthur. The Canadian Pacific Railroad has changed its Lake Superior terminus from Port Arthur to Fort William, a short distance from the former place. This probably settles the fate of Port Arthur for the present. The railroad company has secured a frontage of about five miles on the Kaministiquia River, which will give ample room for coal and other docks. The Canadian government has dredges at work removing impediments to navigation.

The following items are condensed from Duluth newspapers: The Northwestern Fuel Company has received about 175,000 tons of coal this season, and is shipping out from 40 to 50 cars daily. The O. C. B. & C. Company has received so far about 125,000 tons of coal, and hopes to get considerably more. The receipts of coal for the past week, 7892 tons; from opening of navigation to October 11th, 253,184 tons.

Boston. Oct. 16.

[From our Special Correspondent.]

There is no special improvement in the wholesale market for anthracite coal. It is somewhat significant, however, that, notwithstanding the dull trade of the month past to which all agents have confessed, the receipts have been quite heavy, thus showing, as we have all along claimed, that deliveries were made on past orders and various elastic contracts extending from July indefinitely. Receipts are now falling off to some extent.

Retailers have not put out much coal, as yet, and they can stand a good run of trade before finding it necessary to fill up their sheds. Affairs are in an unsettled condition, and the trade does not dare buy ahead even on a basis of $4 f. o. b. for Stove at New York. There is no especial reason for doubting the permanency of the market on its present basis for the rest of the year, but still there is no confidence. If there were a more settled state of affairs, trade would doubtless show some improvement.

We quote f. o. b. prices as follows:

At New York, Stove, $4@$4.15; Broken and Egg, $3.50@$3.65; Pea, $2.40; individual coals, $3.75@$3.90 for Stove, $3.25@$3.50 for Broken and Egg. At Philadelphia, $3.90@$4 for Stove, $2.20 for Pea, $3.30@$3.50 for Broken and Egg. Special coals, $4.85@$5 for Broken, $5.35@$5.50 for Stove.

Pocket trade is reported as fair for the season. Dealers have not altered these prices, which remain at $4.85 for Broken, $4.90 for Egg, and $5.50 for Stove. Although these figures seem high for 100-ton lots, they are lower than those of last year at this time.

There is a very light demand for bituminous coal, and no quickening of the trade is expected for a month to come. We quote cargo lots at $3.50@$3.65 delivered.

The feeling in freights is one of increased firmness, but not enough coal is moving to establish an advance. With colder weather, higher rates are anticipated. We quote:

New York, 75@90c.; Philadelphia, 90c.@$1; Baltimore, $1.10@$1.15; Newport News, $1@$1.10; Richmond, $1.15; Cape Breton, $1.35; Bay of Fundy, $1.30.

There is a better retail trade, with sales chiefly at $5.50@$5.75 for White Ash Stove. We quote:

White ash, furnace, and egg	$5.50
" " stove and nut	5.75
Red ash, egg	6.00
" " stove	6.25
Lorberry, egg and stove	$6.75@ 7.00
Franklin, egg and stove	7.50
Lehigh, furnace, egg and stove	5.75
" nut	5.75

Wharf quotations: $4.50, Broken; $4.85, Stove.

The receipts of domestic coal at this port for the month of October were 209,099 tons, or a decrease of 90,484 tons. The receipts from January 1st to October 1st have been 1,644,768 tons, or a decrease of 101,968 tons, as compared with the same period of 1883.

STATISTICS OF COAL PRODUCTION.

Comparative Statement of the Production of Bituminous Coal for the week ended October 11th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

	1884. Week.	1884. Year.	1883. Week.	1883. Year.
Cumberland Region, Md.				
Tons of 2240 lbs	72,854	2,213,526	53,823	1,972,593
Barclay Region, Pa.				
Barclay RR., tons of 2240 lbs	5,096	233,125	6,337	248,227
Broad Top Region, Pa.				
Huntington & Broad Top RR., of 2240 lbs	4,920	153,037	3,894	148,012
East Broad Top	.....	.....	1,043	33,250
Clearfield Region, Pa.				
Snow Shoe	4,070	140,987	5,770	185,204
Karthaus (Keating)	1,793	39,244	.....	.....
Tyrone & Clearfield	68,743	2,434,244	57,003	2,183,306
Alleghany Region, Pa.				
Gallitzin & Mountain	12,302	305,109	9,380	335,157
Pittsburg Region, Pa.				
West Penn RR.	5.936	216,981	6,211	303,951
SouthwestPenn. RR.	1.926	98.533	3.636	88,218
Pennsylvania RR	5,885	214,755	12,876	473,878
Westmoreland Region, Pa.				
Pennsylvania RR.	23.130	1,013,597	25,638	1,075,015
Monongahela Region, Pa.				
Pennsylvania RR.	3,362	119,759	.....	.....
Total	210,017	7,182,897	185,631	7,046,811
Increase	.....	136,086	.....	.....

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 140,931 tons, as compared with the corresponding period in 1883.

Comparative statement of the production of anthracite coal for the week ended October 11th, and year from January 1st:

Tons of 2240 lbs.	1884. Week.	1884. Year.	1883. Week.	1883. Year.
Wyoming Region.				
D. & H. Canal Co.	88,815	2,905,377	94,064	3,123,357
D. L. & W. RR. Co.	126,933	3,850,562	121,431	3,879,201
Penna. Coal Co.	35,944	983,104	38,353	1,137,789
L. V. RR. Co.	32,537	1,059,059	26,511	1,081,896
P. & N. Y. RR. Co.	6,222	170,760	4,708	164,803
C. RR. of N. J	*	*	*	1,202,078
Penn. Canal Co.	15,444	335,948	17,400	384,117
North & West Br. RR.	12,196	638,300	18,378	357,910
	318,091	9,943,110	320,845	11,331,151
Lehigh Region.				
L. V. RR. Co.	147.561	3,462,416	111,112	3,886,472
C. RR. of N. J	*	*	*	1,126,889
S. H. & W. B. RR.	.....	134,768	1,300	28,711
	147,561	3,597,184	112,412	5,042,072
Schuylkill Region.				
P. & R. RR. Co.	318,007	8,372,526	295,408	7,055,256
Shamokin & Lykens Val.	*	*	*	950,363
	318,007	8,372,526	295,408	8,005,619
Sullivan Region.				
St Line & Sul. RR. Co.	4,981	54,051	1,847	52,197
Total	788,640	21,966,871	730,512	24,431,039
Increase	.....	.....	.....	.....
Decrease	.....	2,464,168	.....	.....

* Included in tonnage of the Philadelphia & Reading Railroad.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1879	20,402,038 tons
" " " " 1880	17,769,941 "
" " " " 1881	21,704,951 "
" " " " 1882	22,365,107 "

Belvidere-Delaware Railroad Report for the week ended October 11th:

	Week.	Year. 1884.	Year. 1883.
Coal for shipment at Coal Port (Trenton)	3,758	81,260	94,649
Coal for shipment at South Amboy	16,865	478,955	486,500
Coal for distribution	21,715	602,918	640,690
Coal for company's use	3,774	142,283	126,206
Total	46,112	1,305,416	1,348,045
Increase	.....	.....	.....
Decrease	.....	42,629	.....

Comparative Statement of the Transportation of Coke over the Pennsylvania Railroad for the week ended October 11th, and year from January 1st:

Tons of 2000 pounds.

	1884. Week.	1884. Year.	1883. Week.	1883. Year.
Gallitzin & Mountain (Alleghany Region)	2,911	105,173	1,258	62,655
West Penn. RR.	.....	24,865	2,495	80,976
Southwest Penn. RR.	30,180	1,684,732	43,081	1,640,418
Penn. & Westmoreland Region, Pa. RR.	3,173	150,203	3,879	172,226
Monongahela, Penn. RR.	1,078	57,687	.....	.....
Pittsburg Region, Pa. RR.	.....	136	586	6,537
Snow Shoe (Clearfield Region)	458	17,781	325	14,218
Total	37,800	2,040,577	51,624	1,977,025
Increase	.....	63,552	.....	.....

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